

Online Self-Service adoption by B2B to subscribe telecom services

Pedro Alexandre Barata Salgueiro

Thesis to obtain the Master of Science Degree in

Information and Enterprise Systems

Supervision: Prof. José Henrique Pereira São Mamede

Examination Committee

Chairperson: Prof. Miguel Leitão Bignolas Mira da Silva

Supervisor: Prof. José Henrique Pereira São Mamede

Member of the Committee: Prof. Rui António Dos Santos Cruz

March 2021

Abstract

Communication Service Providers (CSP) are companies that provide communication services, applications services over the network and include the following categories: telecommunication carriers, content and application service provider and cloud providers. This work will focus on Telecom's and Business to Business (B2B) customer segment.

This year (2020) a drop in Telecom's revenues is expected due to COVID. However, by 2024 it is expected a drop in voice and data services up to 5% and fixed voice up to 10% for B2B segment. The adoption of Self-Service Technologies (SST) allows to solve the problem of selling and serve the customers on-line, increasing customer loyalty, reducing cost, fostering innovation and thus increasing revenues.

The major research question for this work is: "Which factors influence the adoption of online self-service technologies by B2B customers of a Telecom?". In order to derive a conceptual framework to answer this question several theories were used:

- The Technology Acceptance Model (TAM) – That demonstrated the importance of Perceived Usefulness and Perceived Ease Of Use;
- The Innovation Diffusion Theory (IDT) – That considered that Complexity is an obstacle towards adoption;
- SST attitude/intention model – Where Need for Interaction and Risk (in this research perceived as the uncertainty towards price) influence adoption of SST's.

A conceptual framework that drives the adoption of Self-service technologies in Telecom B2B segments was proposed and tested. Five constructs were proposed: Perceived Usefulness, Perceived Ease of Use, Need for Interaction, Complexity and Price. This allowed the proposal of five hypothesis to test. Three of these constructs were identified as influencing the adoption: Perceived Usefulness, Perceived Ease of Use and Price whilst the two others were not, giving some indication for future work.

It was also concluded that there is acceptance for the online subscription of telecom services by B2B customers.

Keywords: Technology Acceptance Model, Telecom, Business To Business, Self-Service Technologies, Innovation Diffusion Theory, SST attitude/intention model

Resumo

Os *Communication Service Providers* (CSP) são empresas que fornecem serviços de comunicação, serviços de aplicativos pela rede e incluem as seguintes categorias: operadoras de telecomunicações, fornecedores de serviços de *cloud* e de aplicativos. Este trabalho foca-se no segmento de clientes de Telecom e Business to Business (B2B).

Este ano (2020), prevê uma queda nas receitas de Telecom ao COVID. No entanto, até 2024 espera-se uma queda nos serviços de voz e dados de até 5% e de voz fixa de até 10% para o segmento B2B. A adoção das Tecnologias de Auto-atendimento permite solucionar o problema de vender e atender os clientes on-line, aumentando a fidelização, reduzindo custos, fomentando a inovação e, assim, aumentando as receitas.

A grande questão de pesquisa para este trabalho é: “Quais fatores influenciam a adoção de tecnologias de auto-atendimento online por clientes B2B de uma Telecom?”. Para deduzir um modelo conceptual para responder a esta pergunta, várias teorias foram utilizadas:

- O Modelo de Aceitação de Tecnologia (TAM) - que demonstrou a importância da Utilidade Percebida e Facilidade de Uso Percebida;
- A Teoria da Difusão da Inovação (IDT) - que considerou a Complexidade um obstáculo à adoção de SST's;
- Modelo de atitude / intenção SST - Onde a Necessidade de Interação e Risco (nesta pesquisa representado como a incerteza relativamente ao preço) são fatores que influenciam a adoção.

Um modelo conceptual para entender a adoção das tecnologias de Auto-atendimento em segmentos de B2B de uma Telecom foi proposta e testada. Cinco construtos foram propostos: Utilidade Percebida, Facilidade de Uso Percebida, Necessidade de Interação, Complexidade e Preço. Isso permitiu o teste de cinco hipóteses. Três desses construtos foram identificados como influenciando a adoção: Utilidade Percebida, Facilidade de Uso Percebida e Preço, enquanto os outros dois não foram, porém dando algumas indicações para trabalhos futuros.

Concluiu-se também que existe aceitação para a subscrição online de serviços de telecomunicações por clientes B2B.

Palavras Chave: Modelo de Aceitação de Tecnologia, Telecom, Business To Business, Tecnologias de Autoatendimento, Teoria de Difusão de Inovação, Modelo de atitude / intenção SST.

Acknowledgments

This research faced some obstacles that weren't able to surpass without the unconditional support of my family.

To my wife Marisa that pushed me on moving this work forward and her unconditional love.

To my daughters Francisca, Marta and Carolina and to their patience because I wasn't available to play.

To professor Henrique São Mamede that was always available and never let me down and his patience for the revisions.

Table of Contents

- Abstract ii**
- Resumo..... iii**
- Acknowledgments iv**
- Table of Contents v**
- List of figures vii**
- List of Tables..... viii**
- List of Acronyms x**
- 1. Introduction 1**
 - 1.1. Context 1
 - 1.2. Problem definition 3
 - 1.3. Solution objectives..... 4
 - 1.4. Research methodology..... 4
 - 1.5. Document structure 7
- 2. Background and Related work 8**
 - 2.1. Self-Service Technologies 9
 - 2.2. Technology Acceptance Model (TAM) 13
 - 2.3. Innovation Diffusion Theory (IDT)..... 14
 - 2.4. SST attitude/intention model 16
- 3. Proposal..... 18**
 - 3.1. Conceptual Framework 18
 - 3.2. Hypothesis Deduction..... 19
- 4. Demonstration..... 23**
 - 4.1. Survey..... 23
 - 4.1.1. Survey invitation 26
 - 4.2. Population and Sample 27
- 5. Evaluation..... 29**
 - 5.1. Descriptive Statistics 29
 - 5.2. Reliability 33
 - 5.2.1. Perceived Usefulness 34

| | | |
|-----------|--|-----------|
| 5.2.2. | PERCEIVED EASE OF USE | 34 |
| 5.2.3. | NEED FOR INTERACTION..... | 34 |
| 5.2.4. | PRICE | 35 |
| 5.2.5. | COMPLEXITY..... | 35 |
| 5.3. | FACTOR ANALISYS..... | 36 |
| 5.4. | Validity | 42 |
| 5.5. | Hypothesis Result – Multiple Linear Regression..... | 43 |
| 5.5.1. | H1. Perceived Usefulness impacts positively the attitude towards the use of self-service telecom services subscription | 44 |
| 5.5.2. | H2. Perceived Ease Of Use impacts positively the attitude towards the use of self-service telecom services subscription | 44 |
| 5.5.3. | H3. The need for interaction impacts negatively the attitude towards the use of self-service telecom services subscription | 44 |
| 5.5.4. | H4. Price impacts negatively the attitude towards the use of self-service telecom services subscription | 44 |
| 5.5.5. | H5. Complexity impacts negatively the attitude towards the use of self-service telecom services subscription | 44 |
| 5.5.6. | Hypothesis Summary..... | 44 |
| 6. | Conclusion | 46 |
| 6.1. | RQ1: “What factors influence the adoption of online self-service technologies by B2B customers of a CSP?”..... | 46 |
| 6.2. | RSQa: “Is it viable to implement on-line self-service / self-provisioning for B2B?” | 46 |
| 6.3. | RSQb: “Will all segments adhere to self-service?”..... | 47 |
| 6.4. | RSQc: “Is it only applicable to simple products or can be used in more complex ones (like SaaS/PaaS/Big Data)?” | 47 |
| 6.5. | Contributions | 47 |
| 6.6. | Future work..... | 47 |
| 7. | References..... | 49 |
| 8. | Annex 1 - Survey..... | 55 |

List of figures

- Figure 1 - Mobile Operator Opportunity Treadmill (Deloitte, 2016) 2
- Figure 2 - The "research onion" (Saunders, Lewis, & Thornhill, 2009) 5
- Figure 3 – Deductive Process (Bryman & Bell, 2011) 6
- Figure 4 - Self-service in B2B 9
- Figure 5 - Global Self-Service Technology Market, 2017-2023 (USD Billion) 10
- Figure 6 - Consumer Behaviour for Operators 11
- Figure 7 - Behaviour for Banks 12
- Figure 8 - CSP Evolution 12
- Figure 9 - TAM Model (Davis, 1989) 13
- Figure 10 - Innovation Adoption Curve 15
- Figure 11 - Factors Innovation Adoption 16
- Figure 12 - SST attitude/intention model (Curran & Meuter, 2005) 17
- Figure 13 - Conceptual Framework 19
- Figure 14 - Convenience Sample Advantages (QuestionPro, 2020) 28
- Figure 15 - Age distribution 30
- Figure 16 – Education Level 31
- Figure 17 - Scree Plot 40

List of Tables

| | |
|--|----|
| Table 1 - Self Service Technologies (Bitner, Ostrom, & Meuter, 2002) | 2 |
| Table 2 - Cost Transaction per Channel (bank)..... | 3 |
| Table 3 - Hypothesis Deduction..... | 21 |
| Table 4 - Company Category..... | 24 |
| Table 5 – Summary of Authors | 25 |
| Table 6 - Survey publication sites..... | 26 |
| Table 7 – Age Groups | 29 |
| Table 8 - Gender..... | 30 |
| Table 9 – Education Degree | 30 |
| Table 10 - Current Self-Service Utilization..... | 31 |
| Table 11 - Subscription for Current Company | 32 |
| Table 12 - Online usage per age group | 32 |
| Table 13 - Online Subscription for Company..... | 33 |
| Table 14 - SME and Corporate SST adoption | 33 |
| Table 15 - Perceived Usefulness Cronbach's..... | 34 |
| Table 16 - Perceived Ease Of Use Cronbach's | 34 |
| Table 17 - Need for Interaction Cronbach's..... | 35 |
| Table 18 - Price Cronbach's | 35 |
| Table 19 - Complexity Cronbach's..... | 36 |
| Table 20 - Complexity Cronbach's revised | 36 |
| Table 21 - KMO and Bartlett's Test | 37 |
| Table 22 - Communalities..... | 37 |
| Table 23 - Total Variance Explained | 39 |
| Table 24 - Rotated component matrix | 40 |
| Table 25 - Pearson's r..... | 42 |
| Table 26 - Model Summary..... | 43 |
| Table 27 - Regression Coefficients..... | 43 |

Table 28 - Hypothesis test summary 45

List of Acronyms

| | |
|--------|---|
| ATM | Automated Teller Machine |
| B2B | Business to Business |
| B2C | Business to Consumer |
| CAGR | Compound Annual Growth Rate |
| CPX | Complexity |
| CRM | Customer Relationship Management |
| CSP | Communication Service Provider |
| EBITDA | Earnings Before Interest, Taxes, Depreciation, And Amortization |
| EU | European Union |
| IAS | Intention to Adopt Self-Service |
| IDT | Innovation Diffusion Theory |
| IOT | Internet Of Things |
| IS | Information System |
| KMO | Kaiser-Meyer-Olkin |
| MEA | Middle East and Africa |
| NFI | Need for Interaction |
| PEOU | Perceived Ease Of Use |
| PR | Price |
| PU | Perceived Usefulness |
| RQ | Research Question |
| SME | Small and Medium Enterprise |
| SOHO | Small Office Home Office |
| SST | Self Service Technology |

1. Introduction

Communication Service Providers (CSP) are companies that provide communication services, applications services over the network and include the following categories: telecommunication carriers, content and application service provider and cloud communications (Gartner Glossary, n.d.).

In the second quarter of 2020, global telecom revenues were 427,000 MUSD, which means a drop of 5.4% when compared to the previous year. The most impacted region was the Americas (8%), Europe (5%), Middle-East and Africa (MEA) (4%) and a less significant drop in Asia (2%) (Markets, 2020).

This year (2020) a drop in revenues is expected due to COVID however by 2024 it is expected a drop in voice and data services up to 5% and fixed voice up to 10% for Business-to-Business (B2B) segment (Gintel, 2020).

Also, the average life span of a S&P500 company reduced from 90 years in 1935 to 14 years in 2010 (Handscorn & Thaker, 2028) which means that companies must adapt for a new world and a new business model. This new adaptation focuses on increasing revenues, reducing costs and increasing customer loyalty (Bollard, Larrea, Singla, & Sood, 2017).

One option to achieve the objectives of cost reduction and customer loyalty is the use of Self-Service Technologies (SST's). With SST's a company can serve more customers in a more standardized way, this means that it can reduce costs and at the same time allows a customer to customize and decide the product/service by him/herself (Hsieh, 2005) thus contributing to customer loyalty.

This work will focus on Telecoms B2B segment adoption of self-service technologies by its customers to subscribe to mobile or other services without any human interaction.

1.1. Context

The COVID 19 brought a huge transformation, or acceleration, on the way companies are selling either on Business to Consumer (B2C) or B2B (Gavin, Harrison, Plotkin, Spillecke, & Stanley, 2020). Especially in the B2B segment where most of the companies sell using a dedicated sales force. This sales force can either be its own or from business partners and are now away from customers physically and challenged by new conditions like new digital tools, cancellation of meetings, stress, and shortage of stocks, for example (Hartmann & Lussierb, 2020). However, not only the direct sales force was impacted, other channels of B2B like agents and retail stores were also.

It is especially difficult for companies selling technology and complex products like telecom providers to be away from customers because when selling part of the signs in the sales interaction are lost (Blont, 2020).

The adoption of SST's allows to solve the problem of selling and serve the customers on-line also COVID will push Communication Service Providers (CSP's) to invest more in this technology (Abraham, 2020). SST's are technological interfaces that enable customers to produce a service independent of direct service employee involvement (Meuter, Ostrom, & Roundt, 2000) .

Adoption of SST's is also a step towards the digitalization of the CSPs because Telecoms are moving from "telcos" into technological companies usually called "techcomms" (Posey, 2020). This transformation implies on having different revenue streams and strengthening the way Telecoms are selling their subscriptions online. Namely, with additional added value and utilizing more customer data. This is part of what Deloitte called "the opportunity treadmill" that is shown in Figure 1 - Mobile Operator Opportunity Treadmill. (Deloitte, 2016)

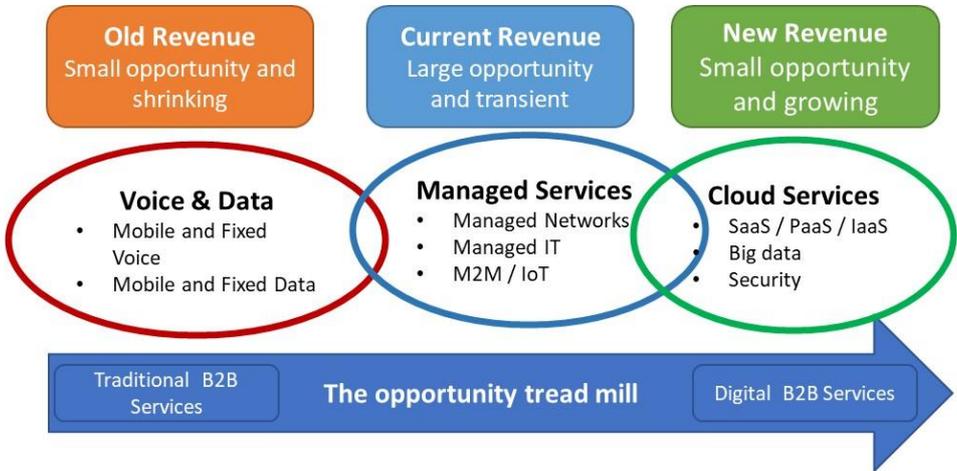


Figure 1 - Mobile Operator Opportunity Treadmill (Deloitte, 2016)

The implementation of SST's by Telecom Operators, instead of using human assisted provision of service, allows companies to accomplish two objectives: to reduce cost and increase service (Bitner, Ostrom, & Meuter, 2002).

Additionally, the creation of innovative e-services also increases the firm value (Chuang & Lin, June 2005) and also allows companies to increase market share and revenue (Chou, 2020). The widespread of technology and its quick evolution is turning the world into a world of "technology-facilitated transactions". These transactions can be carried out through Self-service technologies that disintermediate them allowing the customer to execute and produce a service without the presence or assistance of an employee of the company (Meuter, Ostrom, & Roundt, 2000).

It is important for a CSP to deploy SST for service subscription by its B2B customers. It will to reduce cost and increase service (Bitner, Ostrom, & Meuter, 2002).

Table 1 - Self Service Technologies (Bitner, Ostrom, & Meuter, 2002)

| Interface Purpose | Telephone/Interactive Voice Responses | Online/Internet | Interactive Kiosks | Video/CD |
|-------------------|---|---|---|--|
| Customer Service | <ul style="list-style-type: none"> Telephone Banking Flight Information Order Status | <ul style="list-style-type: none"> Package tracking Account information | <ul style="list-style-type: none"> ATMs Hotel checkout | |
| Transaction | <ul style="list-style-type: none"> Telephone Banking Prescription refills | <ul style="list-style-type: none"> Retail purchasing Financial transactions Service subscription | <ul style="list-style-type: none"> Pay at the pump Hotel checkout Car rental | |
| Self-Help | <ul style="list-style-type: none"> Information telephone lines | <ul style="list-style-type: none"> Internet information search Distance learning | <ul style="list-style-type: none"> Blood pressure machines Tourist information | <ul style="list-style-type: none"> Tax preparation software Television/CD-based training |

Self-Service Technology is not a new concept and has several interfaces like the online, telephone, interactive kiosks or Video and several purposes like customer service, transactions and self-help (Bitner, Ostrom, & Meuter, 2002) as presented in Figure 2.

Table 2 - Cost Transaction per Channel (bank)

| Channel | Average cost per transaction |
|----------------|------------------------------|
| Branch | \$4.25 |
| Call Center | \$1.30 |
| ATM | \$1.25 |
| Online Banking | \$0.19 |
| Mobile | \$0.10 |

Source: Javelin Strategy & Research, 2013

Table 2 - Cost Transaction per Channel (bank) Table 2 provides an insight on the cost saving that can be obtained by a bank when moving transactions from the branch to online or mobile. This means that there is a business driver, cost, towards automation / self-service.

1.2. Problem definition

The SSTs adoption research done within the scope of this research using the online search on google, google scholar and researching literature always pointed to studies related to ecommerce, mobile money, mobile payments, self-checkout in hotels, amongst others but not research done on Telecom or B2B related.

This means that there is not much research done regarding the adoption of an SST for subscribing mobile services for the B2B segment of a Telecom service provider.

When exploring some of the most well-known Telecom websites like Telefonica or British Telecom (BT), for example, if a visitor goes to the business site/page and tries to subscribe for a service as B2B customer, typically what is presented is a contact form to engage with a contact center or a field sales representative. However, this is not the case for B2C segments where self-service is already deployed for more simpler product subscription.

It is also important to understand that an SST is an Information System (IS). According to (Tella & Gbola Olasina, 2014) the success of an IS depends on the continued use intention (use continuance) of the system. Another important aspect and one of the major reasons for result inconsistency towards the factors that influence customers to utilize SSTs is the fact that different type of SSTs have different factors influencing the user that is going to use it (Curran & Meuter, 2005).

Based on this, the main research question (RQ) to address in this research is:

RQ: “Which factors influence the adoption of online self-service technologies by B2B customers of a Telecom?”

In the search for an answer to the research question, we additionally intend to achieve the answers to the following questions:

RSQa: “Is it viable to implement on-line self-service / self-provisioning for B2B?”

RSQb: “Will all segments adhere to self-service?”

RSQc: “Is it only applicable to simple products or can be used in more complex ones (like SaaS/PaaS/Big Data)?”

1.3. Solution objectives

The aim of this research is to answer the research questions and sub-questions presented in the previous section.

1.4. Research methodology

The research methodology must select a path in order to achieve the desired objectives. The “research onion” presented in Figure 2 - The “research onion” is a useful tool for a methodological approach in the research (Saunders, Lewis, & Thornhill, 2009).

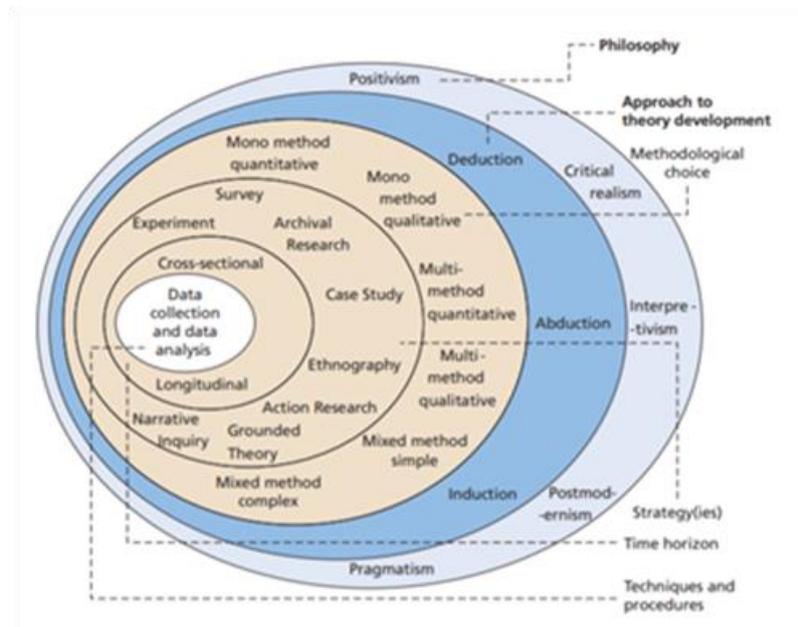


Figure 2 - The "research onion" (Saunders, Lewis, & Thornhill, 2009)

The philosophy that is more adequate for this study is the positivist approach because this research is linked to an observable reality (Saunders, Lewis, & Thornhill, 2009).

The research was conducted through **deductive theory** leading to the deduction of hypothesis to be tested (Robson, 2002). Deductive theory is also adequate for this research because allows the deduction of hypothesis given of what is known, in this case SST, and theoretical considerations (Bryman & Bell, 2011).

Literature research allows for selecting the most approximate conceptual models and theories that could better proxy on helping to answer the current research question. This literature research allowed the selection of the constructs that theoretically would influence either positively or negatively the SST's adoption.

This allowed the creation of a conceptual framework with proposed constructs that would influence the adoption of SST's in the research context and deduct the hypothesis.

To test the deducted hypothesis a survey was made, applied and then analyzed. The deductive process can be observed in Figure 3 – Deductive Process was applied in this research.

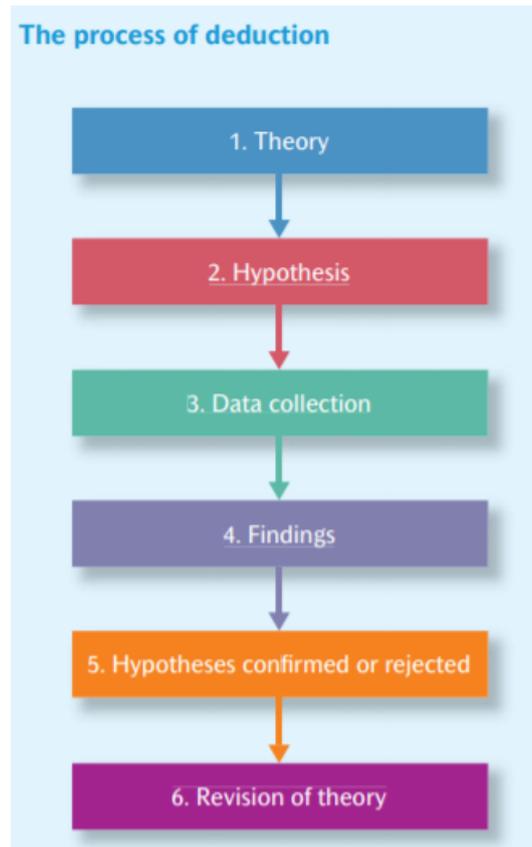


Figure 3 – Deductive Process (Bryman & Bell, 2011)

In order to test the hypothesis a **quantitative research** was followed. Quantitative research is also common in SSTs research and there are examples like the following studies:

- Adopting self-service technology to do more with less (Hilton, Hughes, Little, & Marandi, 2013)
- Customer value in self-service kiosks: a systematic literature review (Vakulenko, Hellström, & Oghazi, 2018)
- Impact of self-service technology (SST) service quality on customer loyalty and behavioral intention: The mediating role of customer satisfaction (Iqbal, Hassan, & Habibah, 2018)

And in fact, there is a dominance of the quantitative methods on SST research (Vakulenko, Hellström, & Oghazi, 2018) so it is reasonable and feasible to utilize this research method in this study.

For this research primary data was collected via a survey. The questions of the survey were done proxying questions already used in surveys in other researches.

Finally, data was gathered and analysed utilizing the selected tools.

1.5. Document structure

After the current **Introduction** that provides background and the motives for the current research this research has five significant chapters:

- **Background and Related work** – This is the chapter is where the models selected under the literature review are presented. Under the current research TAM (technology assessment model), IDT (Innovation Diffusion Theory) and SST attitude/intention model are presented. In this This it is also presented a comprehensive explanation on self-service technologies, presence in the world, challenges and other relevant information to the topic.
- **Proposal** – Based on the related work and research a proposed conceptual framework is presented and the hypothesis for this research are deducted.
- **Demonstration** – The demonstration chapter explains the survey preparation, data collection and methods applied for it.
- **Evaluation** – The evaluation chapter explains the collected results, the statistical methods applied on evaluating them and respective hypothesis testing results.
- **Conclusion** – The last chapter will answer the current research questions and will provide some conclusions and future line of work given the research that was done.

2. Background and Related work

This chapter will analyze the work that is related to the research of this thesis also the following models will be analyzed: Technology Acceptance Model (TAM), Innovation Diffusion Theory (IDT) and SST intention model. It is also presented an introduction to SSTs.

One fact is that there is a lack of research in the B2B/Telecom area regarding self-service so it is helpful to expand knowledge in this area and try to understand the factors that influence the adoption of SSTs in the context of telecom services on-line subscription by a company. This lack of investigation for the SSTs in the corporate context is supported by (Considine & Cormican, 2017).

Self-service is used for subscription plan activation across all the B2B segments of a company, Small Office Home Office (SOHO), Small and Medium Enterprise (SME) and Corporate. But SME's are companies defined according to EU recommendation 2003/361. ¹ and they represent 99% of all the business companies in the EU. So, it is relevant to address SME's needs when subscribing on-line to services and products and probably the most intensive users of the SST's.

Another aspect is that consumers and users are taking more control on how they consume services. There are examples like mobile banking, account management, on-line payments, self-scanning. This led to the term "prosumer" which means "production by consumer" turning this way to "co-creators" of value. With this, personal interactions are being replaced by automated technologies (Considine & Cormican, 2017).

There is a wide spread of diverse types of SSTs and it is critical to understand the determinants that affect their correspondent usage in the future because this adoption has an impact on customer satisfaction that will in turn impact customer retention and profitability. (Meuter, Ostrom, & Roundt, 2000).

(Gavin, Harrison, Plotkin, Spillecke, & Stanley, 2020) analyzed B2B preferences compared direct sales or customer service contact when compared to self-service.

¹ https://ec.europa.eu/growth/smes/sme-definition_en

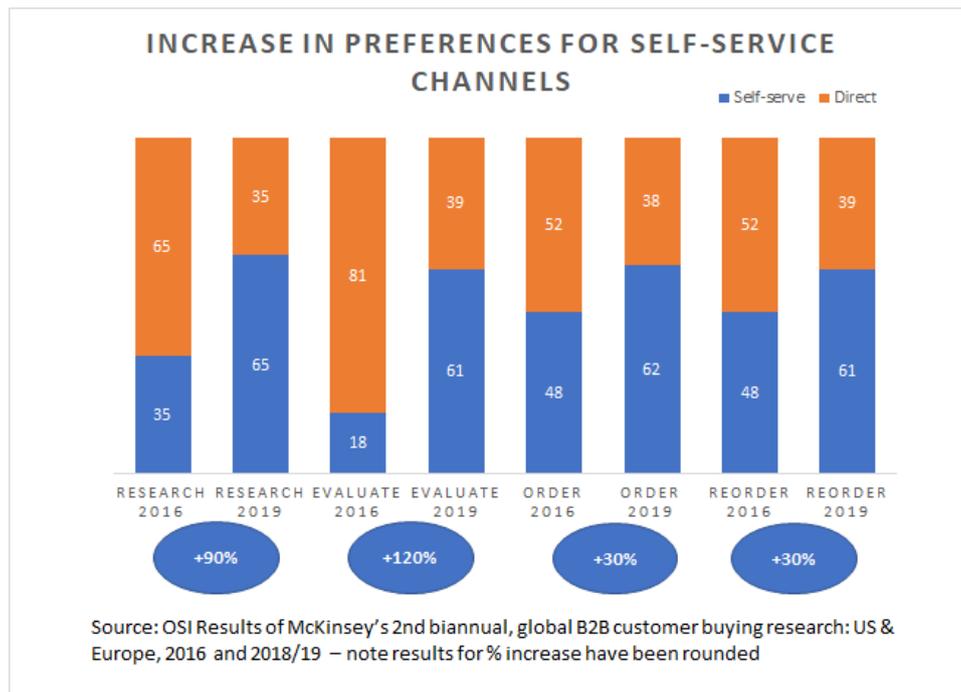


Figure 4 - Self-service in B2B

It is clear now that for B2B self-serve has become more relevant in all the channels from research to ordering. As shown in Figure 4 - Self-service in B2B there was an increase that ranged from +30% to +120% from 2016 to 2019 in the usage of Self-service channels.

As a final remark, it is important to note that in this pandemic situation service innovation is an opportunity for rapid business development. (Heinonen & Strandvik, 2020)

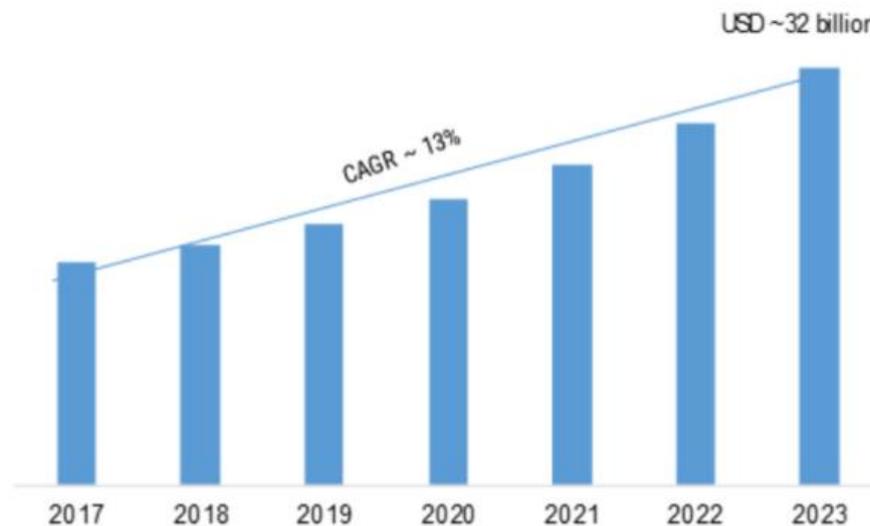
2.1. Self-Service Technologies

Self-service technologies allow users to be an integrative part of the service or product delivery and generate the outcome of a product or service on their own without a company employee participation (Meuter, Ostrom, & Roundt, 2000). This is also in line with the trend that one can observe that consumers are not willing to wait for any service. This behaviour is driven by smartphones and Internet of Things (IOT) technology. SST's also allow businesses to deliver and offer services to its customers on-demand, on any location and without sales representatives (Market Research Future, 2020).

Even though self-service technology is generally adopted and "taken for granted", it changed business models and enterprise processes. (Hughes, 2005)

Self-service technology market is split between telephone/IVR, Internet/Online, Interactive Kiosks and Video/CD (Meuter, Ostrom, & Roundt, 2000). Examples of these technologies are: Automated Teller machines (ATM's), Photo Kiosks, ticketing kiosks, information kiosks, candy vending machines, snack

vending machines, on-line banking, mobile banking, amongst others. This market is intended to grow at 13% Compound Annual Growth Rate (CAGR) until 2023 as shown in Figure 5.



Source: MRFR Analysis

Figure 5 - Global Self-Service Technology Market, 2017-2023 (USD Billion)

This market growth is a consequence of increased adoption in service frontends and the replacement of traditional ways of customer-employee interactions (Marinova., Ruyter, Huang, Meuter, & Challagalla, 2017) (Fernandes & Oliveira, 2021). In fact, they are being introduced in the business-to-business context at a faster pace and further research should be done in the context of B2B to evaluate customer dis/satisfaction for the business customers (Meuter, Ostrom, & Roundt, 2000). SST's are becoming of "critical importance" in the delivery of service for companies, one example of this is that almost half of retail banking transactions are now done in a self-service context (Bitner, Ostrom, & Meuter, 2002).

An area that is growing rapidly in self-service technologies is "direct-transactions". These direct transactions are ordering, buying and exchange resources with other companies and without interference of any of the firms' employees. One good example of this is Amazon.com. (Meuter, Ostrom, & Roundt, 2000). In fact, customers do not want to wait and the customer patience ends after 10 minutes (Dick, 2020)

Whilst Telecoms face huge challenges as "digitalization reshapes the industry landscape", they also find themselves in a declining period with revenue growth dropping 0.5 p.p. (from 4.5% to 4%) and Earnings Before Interest Tax Depreciation and Amortization (EBITDA) dropping 8 p.p. (from 25 to 17%) and cash-flow dropping 11.5 p.p. (from 15.6 to 8%) from 2011 to 2016. On top of this there is a change in the business model and products sold mix, with voice and messaging declining and now representing less

than 30% of the revenues when in 2010 they represented more than 50%. The opposite is happening for data services that has grown from 25% to 65% of the revenues (Caylar & Ménard, 2016).

So, in this context, self-service has been in use for long in telecoms in order to reduce cost in customer service areas. The adoption of self-service for customer service has been utilized with immediate benefits²:

- Reduction of 12% in call volume – issues are resolved online;
- Additional 40% of issues were resolved online.

But there is a fact in a research conducted by (Nuance, 2013) that shows that 71% of consumers prefer a virtual assistant interaction. This is in line with several market changes in order to meet customer expectations and a better “customer journey”. One of these journeys is during the buying experience and is where CSPs/Telecoms are aiming to continue relevant in the digital market and will enable them to grow revenues (Okeleke, 2020).

Self-service technologies have become more important given the COVID context with an increase for online purchase in CSPs context with an increase of 1 p.p when compared to a pre-COVID scenario and much higher expectation in the banking sector (Cap Gemini Research Institute, 2020).

In Figure 6 can be observed the behavior of consumers for operators.

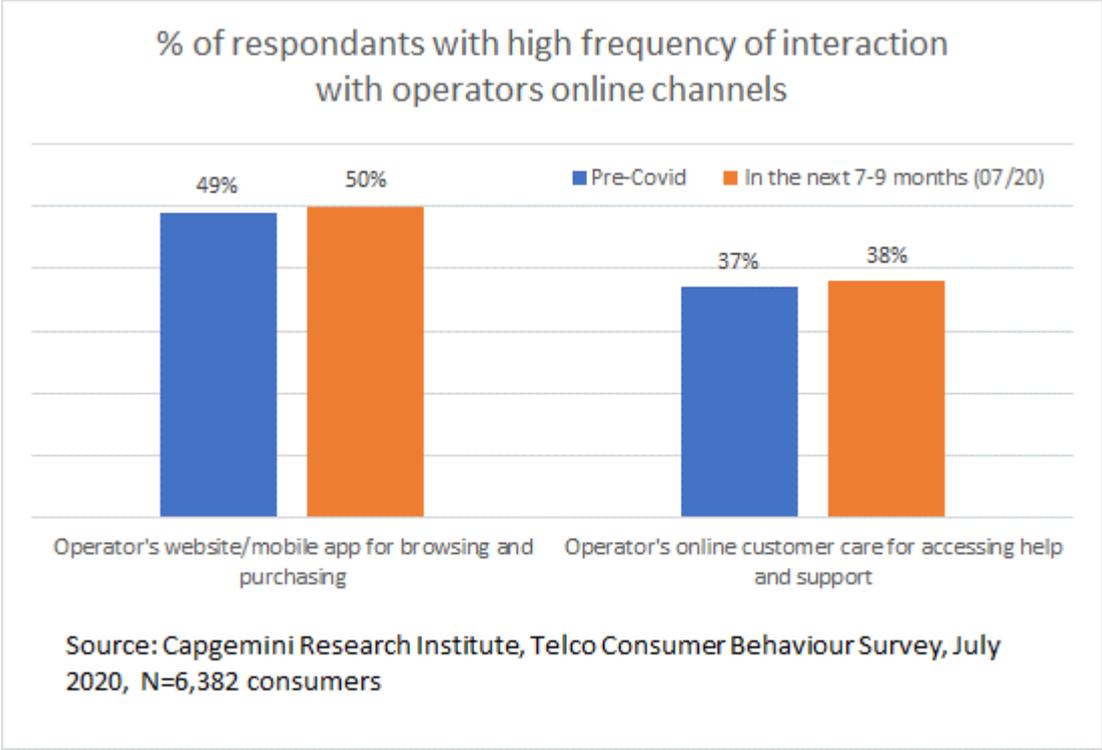


Figure 6 - Consumer Behaviour for Operators

² <https://www.egain.com/solutions/telecom/telecom-increase-customer-adoption/>

And in Figure 7 is observed the change in consumer behaviour for banks.

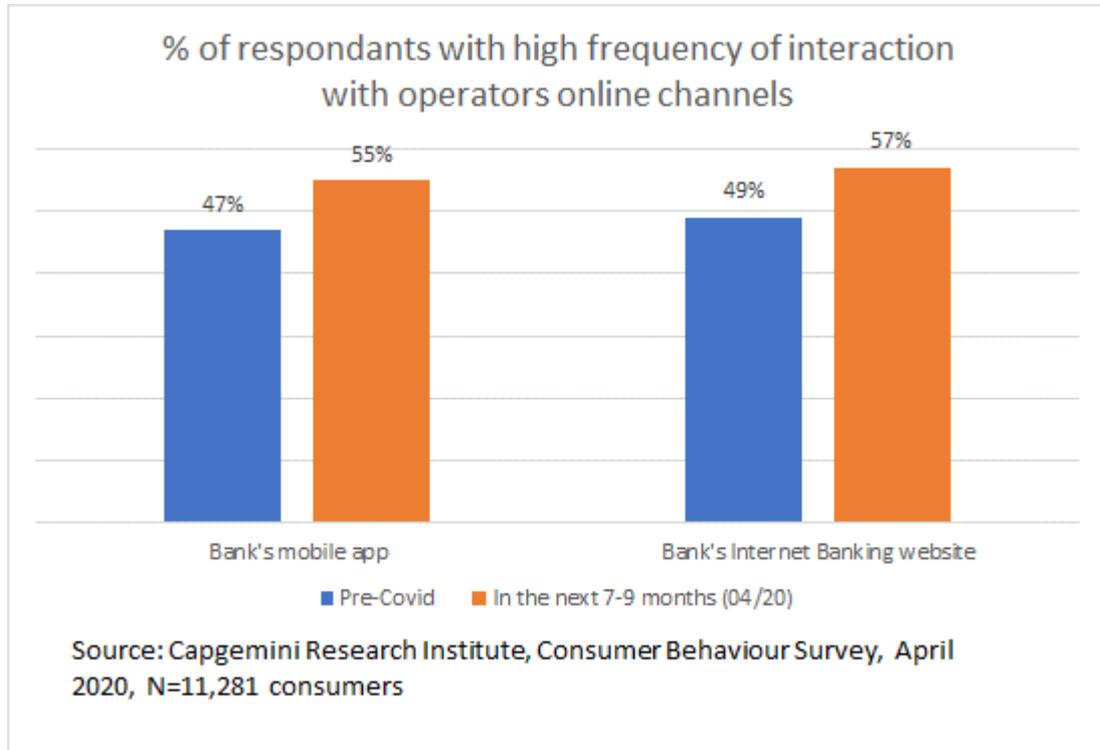


Figure 7 - Behaviour for Banks

According to (Panajotovic & Odadzic, 2009) adopting SST's allow better customer experience, customer knowledge, reduce operational costs, reduce marketing costs, easier provision of new services, shorter time to provide a service, closer relationship with the customer and by the end increase in profit.

This is in line with what a CSP/Telecom has to adopt when moving towards a Digital Service Provider as proposed by (IBM, 2016) in Figure 8.

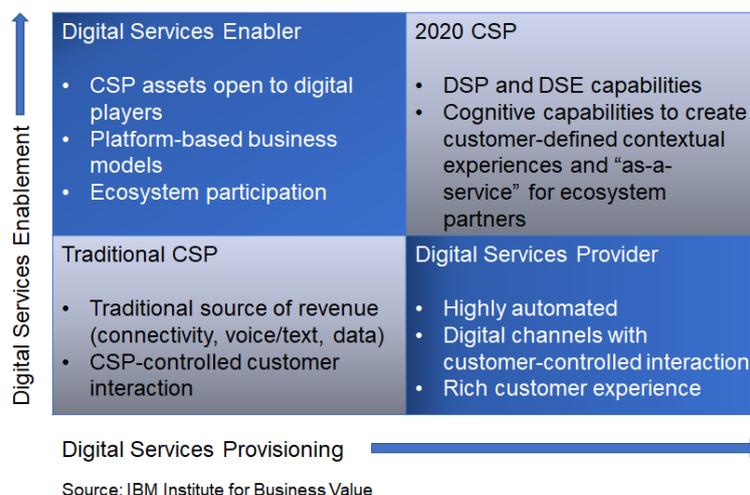


Figure 8 - CSP Evolution

Lastly, customers prefer to engage with companies through their digital journeys via online/internet: 83% for marketing and 53% for sales (Dick, 2020).

2.2. Technology Acceptance Model (TAM)

Introduced by Davis in 1989, The Technology Acceptance Model (TAM), which is an extension or expansion of the Theory of Reason Action (TRA), that was developed by (Fishbein & Ajzen, 1975) and has been widely used to assess the adoption of SSTs (Davis, 1989), namely, e-commerce (Nyoro, Kamau, Wanyembi, Titus, & Dinda, 2015).

(Davis, 1989) expanded the TRA theory because at the time there were no reliable frameworks to predict and the intention to use an information system. Due to this absence of research, it was common to see in practice unvalidated measures throughout design, selection, implementation and evaluation of systems. So besides of its academic value, TAM also has a practical value.

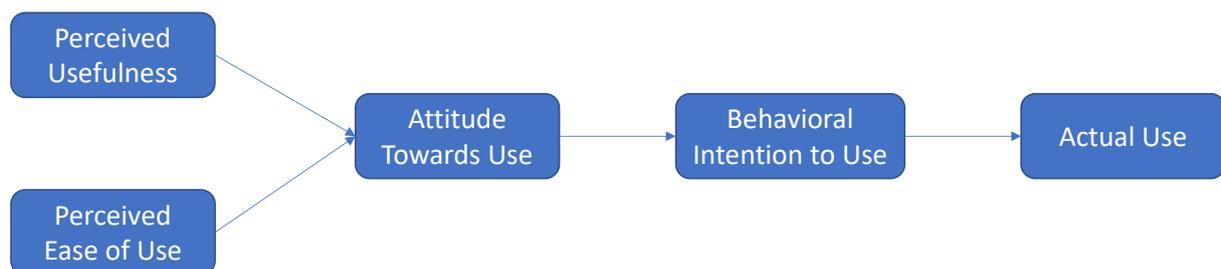


Figure 9 - TAM Model (Davis, 1989)

As presented in Figure 9, TAM framework has two fundamental constructs (Davis, 1989):

- **Perceived usefulness (PU):** “the degree to which a person believes that using a particular system would enhance his or her job performance”. This means that people will use a system if they perceive a system will help on executing its job;
- **Perceived ease of use (PEOU):** “the degree to which a person believes that using a particular system would be free of effort”. One aspect referred by (Davis, 1989) is that in equal circumstances if one application seems to be easier to use when compared to other, people will tend to adopt it.

The TAM model is also influenced by external variables like Quality of Content, Faith of Application, Travel Company; Utility, Quality of Content, Entertainment, Price, Design, Personalization, Organization, Collaboration Environment, Interaction, Information Offer, Personalization, Playfulness, Instant Connectivity (Hong & Yu, 2018) but according to (Davis, 1989) these two beliefs, PU and PEOU, determines an individual intention to use a system and provides a quick and inexpensive way to determine a system adoption (Gu, Lee, & Suh, 2009).

TAM evolved to a TAM2 (Venkatesh & Davis, 2000) by incorporating additional theoretical constructs:

- Social influence processes: subjective norm, voluntariness and image;
- Cognitive instrumental processes: job relevance; output quality; result demonstrability and perceived ease of use.

Usually, TAM and TAM2 explain 40% of the adoption of a system use.

TAM has been adopted in evaluating adoption of such diverse technologies like:

- Mobile payments adoption by US consumers: an extended TAM (Bailey, Pentina, Mishra, & Mimoun, 2017) a research conducted to analyse adoption of mobile payments, where the authors demonstrated that TAM core variables **perceived ease of use** and **perceived usefulness are determinant** for the adoption of mobile payments thus replicating the same effect has previous researches;
- User Acceptance Towards Web-based Learning Systems: Investigating the role of Social, Organizational and Individual factors in European Higher Education (Tarhini, Hone, & Liu, 2013) a research towards web-based learning where the authors also demonstrated the strength of the two constructs **PU** and **PEOU** as previous researches when considering adoption. However, it was noted that PU was the strongest determinant of the TAM model;
- Technology Acceptance Model for the Internet Banking Acceptance in Split (Vuković, Pivac, & Kundid, 2019) used TAM model to access the usage of internet banking. Again it was demonstrated as in previous researches that perceived ease of use and perceived usefulness are predictors of Internet Banking Acceptance.

2.3. Innovation Diffusion Theory (IDT)

This model was first introduced in 1962 (Rogers, 2003) and tries to explain how an innovation is adopted over time. Innovation can be a product, a service or a behavior (LaMorte, 2019). An innovation is diffused through time: "Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system" (Singer, 2019) This means that an innovation does

not have the adherence or diffusion of everyone at the same time. In fact, there are 5 types of adopters that will embrace an innovation over time. (Rogers, 2003).

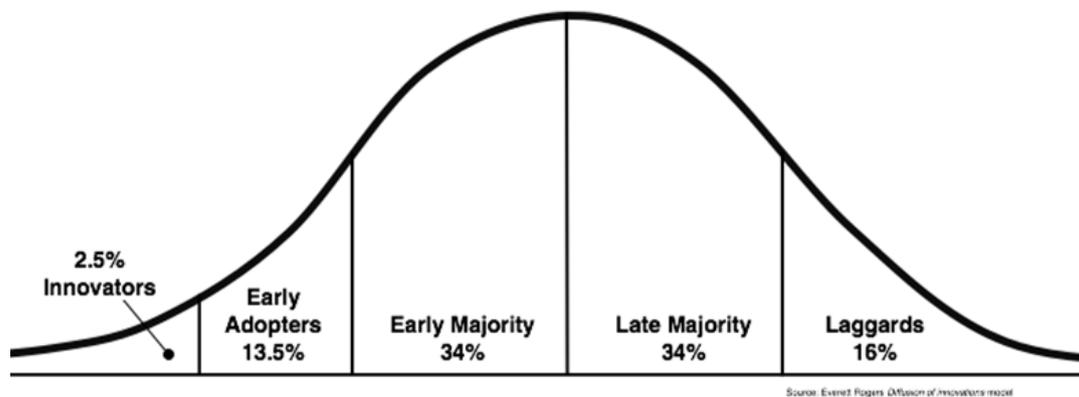


Figure 10 - Innovation Adoption Curve

As shown in Figure 10 an innovation is not adopted by everyone at the same time. This will be dependent on five determinants.

(Rogers, 2003) also concluded that there are five determinants that influence adoption: Relative advantage, Compability, Complexity, Triability and Observability as shown in Figure 11:

- **Relative advantage** indicates how a new technology is perceived either by being better than its predecessor or because it is a replacement. Usually early innovations are priced higher which can be an obstacle towards adoption.
- **Compability** means that the new system is similar or not to the one the user has. If it is substantially different is an obstacle towards adoption.
- **Complexity** means the degree on which an innovation is perceived as simple to use. If an innovation is complex it creates a barrier towards adoption.
- **Triability** has a positive effect on the adoption. It is very common to see technology providers allowing a customer to do a free trial in order to test the technology.
- **Observality** means that the technology benefits are perceived by the public. For example having a more powerful CPU will show a computer running faster.

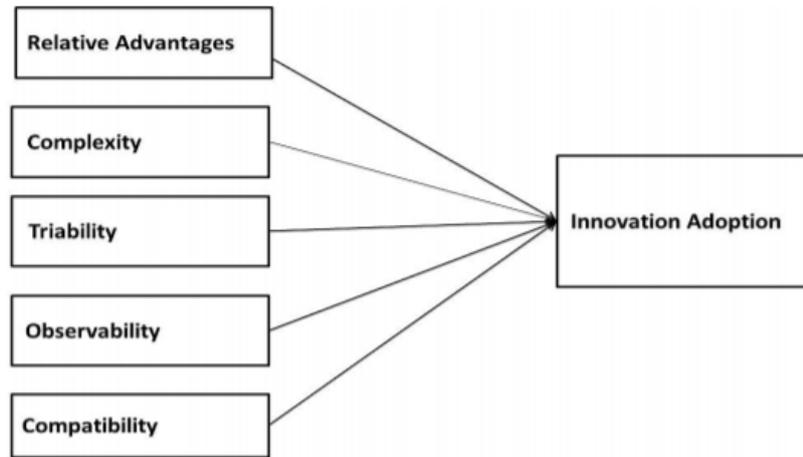


Figure 11 - Factors Innovation Adoption

One of the determinants that is considered more relevant for this research is complexity that was defined by (Rogers, 2003) as “the degree to which an innovation is perceived as relatively difficult to understand and use” and correlates negatively to the rate of adoption. This means that if it is difficult to understand an innovation then its adoption will be negatively impacted. Also, in research carried after Rogers, it was determined that it is statically significant and relevant when it comes to terms of more complex network based IS standard, when considering system complexity and technical knowledge (Kapoor, Dwivedi, & Williams, 2014).

Also (Kapoor, Dwivedi, & Williams, 2014) mention that combability and complexity are significant determinants in small business contexts.

2.4. SST attitude/intention model

(Curran & Meuter, 2005) presented a new model that complements TAM by introducing two additional determinants: Need for interaction and risk as shown in Figure 12.

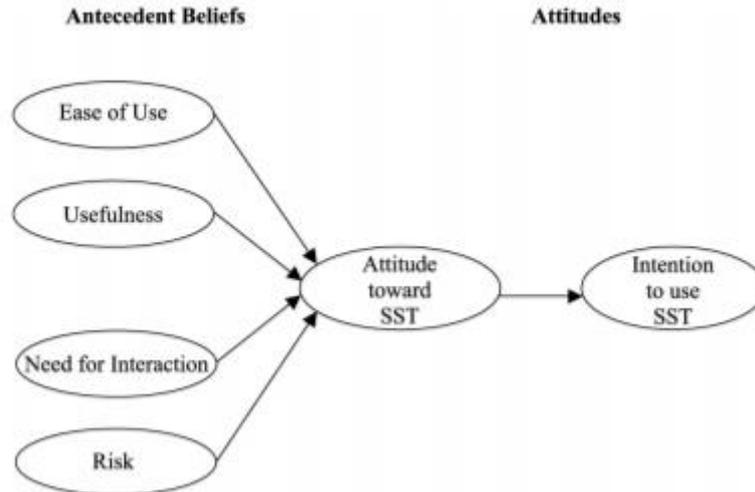


Figure 12 - SST attitude/intention model (Curran & Meuter, 2005)

SSTs are very good for service providers because they can “standardize service delivery, reduce labour costs and expand the options for delivery” but at the same time is challenging if not accepted by the users (Curran & Meuter, 2005), that’s why these two new determinants were introduced.

Need for interaction is the need to maintain contact and a personal relationship level with a person from the firm that is delivering the service (Curran & Meuter, 2005). This means that personal interaction will have a negative attitude towards SSTs if a person prefers it.

Definition of Risk in the SSTs context is defined as “an uncertain consequence of an event or an activity with respect to something that human’s value”. (Aven & Renn, 2009)

Risk refers to the uncertainty regarding factors that can be learning requirements, price and social relevance (Curran & Meuter, 2005) and has a negative impact towards the attitude of using a SST.

The particular risk, Price, can be of particular importance in buying a service online if the perception of the buyer is that is going to pay more.

3. Proposal

After the research of books, journals, articles on-line and offline it was concluded that there is not enough documentation regarding the adoption of SSTs to subscribe online telecom services by B2B customers.

The current proposal is an adaptation of the TAM model and the constructs that were presented in the related work section.

Given the conclusions of the research, a conceptual is proposed to address the determinants that influence the adoption of self-service subscription by B2B customers. This research will not address purchase of products because usually those are hardware related and bought online at the telecom store.

3.1. Conceptual Framework

In Background and Related work chapter several theories were described in order to try to derive a conceptual model that could be designed and tested in order to understand so based on:

- Technology Acceptance Model (Davis, 1989) – This theory demonstrated the importance of Perceived Usefulness and Perceived Ease Of Use; in fact this theory and this two factor can explain 40% of the intention for use;
- Innovation Diffusion Theory (IDT) (Rogers, 2003) – That considered that Complexity is an obstacle towards adoption;
- SST attitude/intention model (Curran & Meuter, 2005) – Where Need for Interaction and Risk, in this research perceived the uncertainty towards price.

These three theories allowed to design a new conceptual framework that drives the adoption of Self-service technologies in Telecom B2B segments.

This framework is presented in Figure 13. The conceptual framework that is going to be evaluated also allowed the formulation of five hypothesis to be tested under the current research.

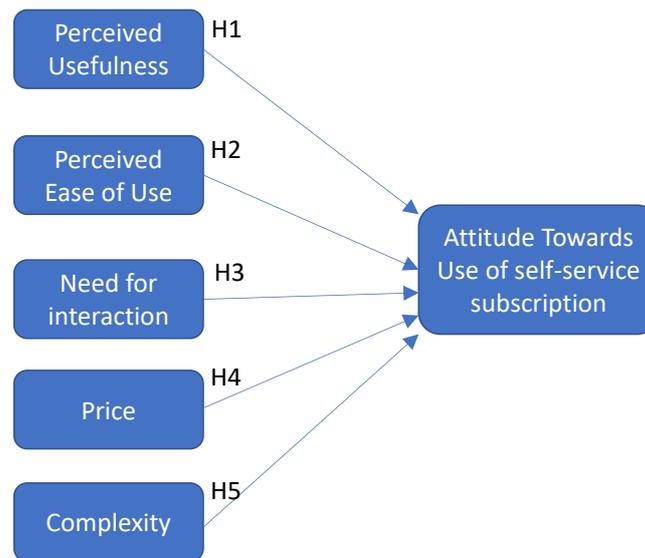


Figure 13 - Conceptual Framework

The next sections present the five formulated hypotheses related to the five independent variables presented in this conceptual framework.

3.2. Hypothesis Deduction

H1. Perceived Usefulness (PU) impacts positively the attitude towards the use of self-service telecom services subscription

Perceived Usefulness (PU) is “an individual’s subjective awareness of monetary and performance value of a technology” (Davis, 1989) showed that Perceived Usefulness is an important determinant towards the adoption of self-service technologies.

(Blut, Wang, & Schoefe, 2016) also demonstrated that PU is a good determinant for the SST adoption. However, they also concluded that is not enough by it itself to predict SST adoption.

Research driven by (Yang, Yang, & Liu, 2012) also confirmed that PU has a positive impact on the adoption of SST’s.

Studies about mobile banking demonstrated that PU is one of the strongest determinants for the intention to adopt that type of SST (Venkatesh & Davis, 2000).

H2. Perceived Ease Of Use (PEOU) impacts positively the attitude towards the use of self-service telecom services subscription

Online shopping research (mobile subscription of services is considered as online shopping) demonstrated that Perceived Ease Of Use (PEOU) has a positive influence in the intention for shopping online and contribute for customer satisfaction (Ramayah & Ignatius, 2005).

Another SST like selling online airline tickets showed that Perceived Usefulness (PU), Perceived Ease of Use (PEOU) and trust influence positively the attitude towards ticketing usability, in line with previous researches (Renny, Guritno, & Siringoringo, 2012).

H3. The Need For Interaction (NFI) impacts negatively the attitude towards the use of self-service telecom services subscription

If a person prefers an employee to deliver a product or service during a service encounter that is defined as a need for interaction (Dabholkar, 1996).

One of the advantages of SSTs is the absence of human interaction creating a replicable and more efficient process. However, when a company is creating value in B2B sales, professional customers value service time, personal relationship and professional sellers (Pawłowski & Pastuszak, 2016).

So, it is important to understand that the need for interaction will impact negatively the attitude towards SSTs. This was already researched and confirmed by (Curran & Meuter, 2005). Specially because consumers will avoid self-service technology if they have a great need for interaction (Dabholkar & Bagozzi, 2002)

H4. Price impacts negatively the attitude towards the use of self-service telecom services subscription

(Curran & Meuter, 2005) definition of risk refers to the uncertainty regarding factors that can be learning requirements, price and social relevance. For business buyer's price can be of importance in subscribing a service online.

If company can help a customer on saving money or have additional perks this also contributes to that customer (Meuter, Ostrom, & Roundt, 2000). This means that price is of importance for the customer and for this reason price was included as a determinant.

Another interesting fact is that B2B sellers try to optimize prices, meet customer specification criteria, comply with regulatory conditions and also be ethical and at the same time procurement from the buyer side try to maximize their cost-of-ownership models, "to ensure that rational, quantifiable criteria around price and performance shape their analyses" (Almquist, Cleghorn, & Sherer, 2018).

Finally, according to (Abbas, Nawaz, Ahmad, & Ashraf, 2017) price is a predictor of resistance to innovation.

H5. Complexity impacts negatively the attitude towards the use of self-service telecom services subscription

Complexity means the degree on which an innovation is perceived as simple to use. If an innovation is complex it creates a barrier towards adoption. (Rogers, 2003).

If complexity increases, it increases risk perception. This risk can be time risk or financial risk. (Maity & Dass, 2014) in this case the risk perception of paying a higher cost.

Researches in other fields of study regarding the complexity of innovations has shown that it is highly negatively related to the rate of adoption (Singh, 1966).

But when evaluating more recent research one can find that less innovative products are more easily adopted because if a product is perceived as complex will be difficult to use. This means that complexity has a positive effect towards resistance to an innovation and a negative one towards diffusion.

Complexity, also has a significant impact on technology adoption and is one of the best and most consistent predictors of resistance to innovation (Abbas, Nawaz, Ahmad, & Ashraf, 2017).

Hypothesis Deduction Resumed

In Table 3 the hypothesis deducted and the respective contribute authors are presented.

Table 3 - Hypothesis Deduction

| Hypothesis | Authors |
|--|--|
| H1. Perceived Usefulness impacts positively the attitude towards the use of self-service telecom services subscription | (Blut, Wang, & Schoefe, 2016); (Blut, Wang, & Schoefe, 2016); (Yang, Yang, & Liu, 2012); (Venkatesh & Davis, 2000) |
| H2. Perceived Ease Of Use impacts positively the attitude towards the use of self-service telecom services subscription | (Ramayah & Ignatius, 2005); (Renny, Guritno, & Siringoringo, 2012) |
| H3. The need for interaction impacts negatively the attitude towards the use of self-service telecom services subscription | (Dabholkar, 1996); (Pawłowski & Pastuszak, 2016); (Curran & Meuter, 2005); (Dabholkar & Bagozzi, 2002) |
| H4. Price impacts negatively the attitude towards the use of self-service telecom services subscription | (Curran & Meuter, 2005); (Meuter, Ostrom, & Roundt, 2000); (Almquist, Cleghorn, & Sherer, 2018); (Abbas, Nawaz, Ahmad, & Ashraf, 2017) |

| Hypothesis | Authors |
|--|--|
| H5. Complexity impacts negatively the attitude towards the use of self-service telecom services subscription | (Rogers, 2003); (Maity & Dass, 2014); (Singh, 1966); (Singh, 1966) |

The next chapters will allow the validation of the proposed hypothesis confirming or not positive or negative impact towards the adoption of SST's in the subscription of telecom services by business customers.

4. Demonstration

As mentioned previously this research will follow a quantitative approach. The adopted method to collect primary data was through a survey.

4.1. Survey

Implementing a survey starts by elaborating a questionnaire that is administered to a part of the population. In a survey several types of questions are usually made regarding:

- Intentions;
- Attitudes;
- Awareness;
- Motivations;
- Socio-demographic factors;

Surveys can be done verbally or in writing. Typical methods for voice are personal interviews or phone interviews and typical methods for in writing are email and online surveys. Also, in this research, a structured approach was used, meaning that there was a standardization in the collection process: a questionnaire with a given order for the questions. (Malhotra & Birks, 2006)

Survey Preparation

The survey was built with four blocks:

- Demographics – Age, Gender;
- Business classification – Number of employees, turnover;
- Attitude toward self-service – Is and will be user of self-service;
- Intention to use – Intend to use self-service to subscribe on-line telecom services;
- Constructs – Perceived Usefulness, Perceived Ease Of Use, Need For Interaction, Price and Complexity.

Age factor was segmented according to 4 ranges: From 18-25, university and first job, from 26-35 financial autonomy that comes with stability; from 36-50 the professional maturity and more than 50 planning retirement.

In order to segment the types of business in terms of business types Large Company or SME the EU recommendation 2003/361. The drivers that are used are headcount and revenue.

The split in terms of medium, small or micro is as presented in Table 4 above 250 staff headcount and 50 million euro turnover.

Table 4 - Company Category

| Company Category | Staff headcount | Turnover |
|-------------------------|------------------------|-----------------|
| Medium-sized | < 250 | ≤ € 50 m |
| Small | < 50 | ≤ € 10 m |
| Micro | < 10 | ≤ € 2 m |

In order to build a survey with robust questions aside the socio-demographic ones, in this research the survey questions were based on some authors studies summarized in Table 5, namely:

- Perceived Usefulness and Perceived Ease of Use question were based on (Rigopoulos & Askounis, 2007):
 - **Perceived Usefulness**
 - A new payment system is useful for the purchase of goods/services;
 - A new payment system makes the purchase of goods/services easier;
 - A new payment system makes the purchase of goods/services more convenient;
 - A new payment system makes the purchase of goods/services faster;
 - **Perceived Ease of Use**
 - New payment service is easy to use;
 - New payment service is easy to understand;
 - New payment service is simple;
 - Using the new payment service can be easily skillful.
- Regarding price this research followed the questions of (Heinz, 2020) on financial risk:
 - There is a high chance that I will stand to lose money because this insurance costs more than it should to maintain it;
 - There is a high chance that I will stand to lose money because this insurance product will not be used;
 - I am concerned that I really would not get my money's worth from the product.
- Need for interaction was based on (Kattara & El-Said, 2014):
 - I don't prefer to use a machine in different hotel transaction when I could deal with a person instead;
 - Sometimes I prefer to use technology rather than dealing with employees because it saves time.

- Finally, the complexity constructs were based on following (Deloitte, 2016) considering that the referred treadmill was evolving from less to more complex solutions.

In summary it is presented in Table 5 the survey section and respective author on which the final survey constructs where based on.

Table 5 – Summary of Authors

| SURVEY SECTION | Authors |
|-------------------------------------|-------------------------------|
| Perceived Usefulness (PE) | (Rigopoulos & Askounis, 2007) |
| Perceived Ease Of Use (PEOU) | (Rigopoulos & Askounis, 2007) |
| Price (PR) | (Heinz, 2020) |
| Need For Interaction (NFI) | (Kattara & El-Said, 2014) |
| Complexity (CPX) | (Deloitte, 2016) |

The PE, PEOU, PR, NFI and CPX constructs questions were rated according to a the most widely used Likert scale (Saunders, Lewis, & Thornhill, 2009). These are the independent variables of the conceptual framework.

The dependent variable: Attitude towards use of self-service online was also represented in a single question represented as Intention to Adopt Self-service (IAS).

The complete survey is presented in Annex 1 and is split between the demographic section, the intention for use and the influencing factors sections.

After building the survey, it was pre-tested in a community of 14 people to assess the survey in terms of clarity, easiness and completion. In order to have a solid survey it is important to pre-test it. This way it is known beforehand if the survey itself has issues to solve (Presser, et al., 2004)

The pre-test was done from 16/11/2020 to 21/11/2020 to a group of 14 people with ages between 23 and 50 years old, education from high school to master's degree/MBA and users of online self-service. Some minor corrections were made to the questions and sentences. However, these surveys were not considered into the final number of analysed surveys.

4.1.1. Survey invitation

(Müller, Sedley, & Ferrall-Nunge, 2014) refer that in order to have people answering surveys one can use:

- Mail or written surveys;
- Phone surveys;
- Face-to-face surveys or In-person surveys;
- Internet surveys.

One of the most used methods used in most of the research, especially Human Computer Interaction (HCI) is through internet surveys. Using the internet allows to have global reach, it is easy to create the surveys and the cost is better when compared to the other methods (Müller, Sedley, & Ferrall-Nunge, 2014).

The survey was posted on the social media network LinkedIn with a potential target of 15.091 users from several countries and industries. The post on LinkedIn was as follows:

Title: “Does self-service matter for telecom services?”

Text: “Dear all,

*I am writing a dissertation on the importance of self service on subscribing telecom services. The purpose of this research is to answer this fundamental question: **What factors influence the adoption of online self-service technologies by B2B customers of a CSP (Communication Service Provider)**”*

In order to assist me on this task I kindly ask you to answer the survey in the following link: <https://forms.gle/SzL7Cynq5ge5uHWo8>. It will take no longer than 10 minutes to complete.

The answers are anonymous and will be used only within the scope of this research.

Kind regards,

Pedro Salgueiro”

The post was available on-line from 06/12/2020 until 20/12/2020 using several communities in LinkedIn, Facebook and research sites presented in Table 6.

Table 6 - Survey publication sites

| | Users | Date Posted (year 2020) |
|--------------------------------|--------------|------------------------------------|
| Facebook | | |
| Engenharia de Telecomunicações | 1,800 | 6/12 |
| Telecom Technology | 1,800 | 6/12 |

| | | |
|--|---------|------|
| Telecom Workers Page | 3,200 | 6/12 |
| TELECOM ENGINEERS | 3,200 | 7/12 |
| Telecom Engineers | 22,400 | 7/12 |
| | | |
| Linkedin | | |
| Business Development - The Missing Link between Marketing & Sales | 368,244 | 6/12 |
| Telecoms Professionals: IoT, LTE, M2M, 5G, Internet of Things | 718,949 | 6/12 |
| Telecommunications Industries Management Forum | 169,114 | 6/12 |
| Value Added Networking | 8,296 | 8/12 |
| Online/Mobile Market Research & Surveys | 7,005 | 8/12 |
| Formulation Research and Development | 17,817 | |
| Digital Transformation: Discussion Forum for Apps IOT AI Blockchain Cloud (Azure, AWS) | 21,986 | 9/12 |
| Digital Strategy & Transformation | 31,891 | 9/12 |
| Transformation Digitale / Digital Transformation | 30,638 | |
| Tips on Digital Transformation & Operations | 5,242 | |
| Take a Survey, Post a Survey | 1,788 | 8/12 |
| Survey Exchange – Find participants for research studies (for dissertation, thesis, market research) | 5,207 | |
| | | |
| Quora | .n.a. | 7/12 |
| | | |
| Survey Circle | .n.a | 8/12 |

The number of elements participating in each group assured that there were enough potential participants in the survey.

4.2. Population and Sample

In business research like market surveys or case study research when there is no sampling frame, meaning that our sample would be chosen statistically at random, a nonprobability sampling will be used. Also, in early stages of research of a problem such as the one presented in this study is the most practical one (Saunders, Lewis, & Thornhill, 2009). The current research utilizes a nonprobability sampling technique that is **convenience sampling**. Convenience sampling is usually used for collecting

a large amount of data. Using this technique, they can observe habits, opinions, and viewpoints in the easiest possible manner. (QuestionPro, 2020) and has several advantages that are presented in Figure 14 - Convenience Sample Advantages Figure 14.



Figure 14 - Convenience Sample Advantages (QuestionPro, 2020)

Nonprobability sampling was more adequate since to distribute the survey social media was used. This means that it is not possible to have everyone in the population to have the same chance on being selected. It is also an approach usually applied by researchers (Bryman & Bell, 2011).

(Tabachnick & Fidell, 2007) propose a formula to determine the minimum size of sample:

$$N > 50 + 8m$$

N = number of Participants

m = number of Independent Variables (IV's)

For the purpose of this research $N > 50 + 8 \times 5$. This corresponds on having more than 90 valid responses. However, (Malhotra & Birks, 2006) recommend that the sample size should be at least five times the number of variables being analysed, which for a survey with 23 questions represents a sample of 115 respondents. To be on a safe side the target was to have 120 respondents to the survey, but 125 answers were considered for the analysis.

5. Evaluation

This chapter is composed of the following sections: Characteristics of the sample, statistical analysis of the proposed framework and confirmation or not of the hypothesis.

For this evaluation the used tools were Google Forms to build the questionnaire for the survey and IBM SPSS Statistics and Microsoft Excel to analyze data.

The steps considered on the evaluation where reliability analysis in order to check if the answers where not biased, factor analysis in order to reduce the number of factors, validity in order to test variable relationship and finally regression analysis to validate the work hypothesis.

5.1. Descriptive Statistics

In the following section the descriptive statistics is presented with output from IBM SPSS. The tables are presented with:

- Frequency – The number of times a given characteristic is counted;
- Percent – The frequency in percentage of the total frequencies;
- Valid Percent – The frequency of valid answers (accepted answers of the survey) in percentage of the total of frequencies;
- Cumulative Percent - The cumulative percentage.

The survey was answered by 125 respondents. Most of the people was aged between 36 to 50 years, as per showed in Table 7.

Table 7 – Age Groups

| | Age | | | Cumulative Percent |
|-------|-----------|---------|---------------|--------------------|
| | Frequency | Percent | Valid Percent | |
| 18-25 | 11 | 8.8 | 8.8 | 8.8 |
| 26-35 | 15 | 12.0 | 12.0 | 20.8 |
| 36-50 | 89 | 71.2 | 71.2 | 92.0 |
| +50 | 10 | 8.0 | 8.0 | 100.0 |
| Total | 125 | 100.0 | 100.0 | |

Figure 15 shows that more than half of the respondents are between 36 and 50 years old.

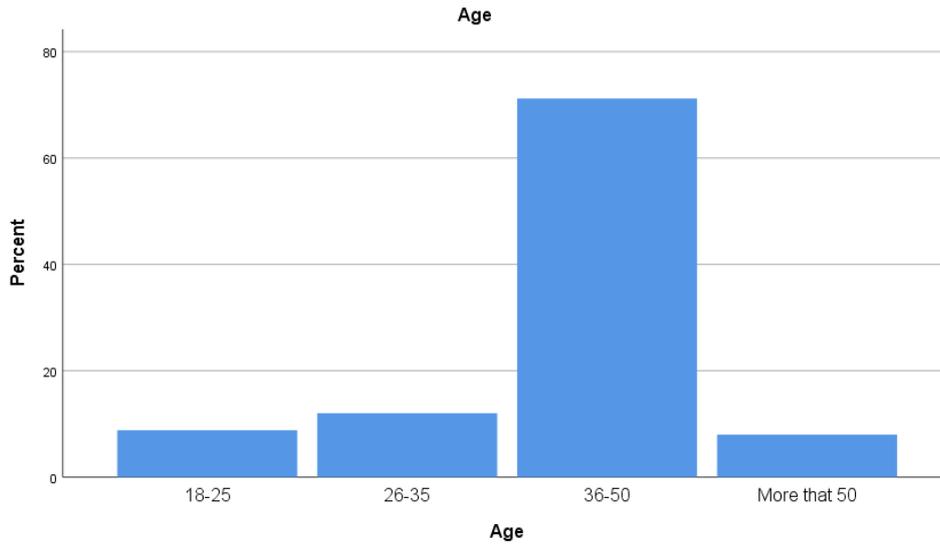


Figure 15 - Age distribution

There is also almost an even split between males and females with a small preponderance to males as seen in Table 8.

Table 8 - Gender

| Gender | | | | |
|-----------------------|-----------|---------|---------------|--------------------|
| | Frequency | Percent | Valid Percent | Cumulative Percent |
| Female | 58 | 46.4 | 46.4 | 46.4 |
| Male | 66 | 52.8 | 52.8 | 99.2 |
| There are no other... | 1 | .8 | .8 | 100.0 |
| Total | 125 | 100.0 | 100.0 | |

Most of the respondents (80%) has a bachelor's degree or higher as shown in Table 9.

Table 9 – Education Degree

| Education | | | | |
|-------------------|-----------|---------|---------------|--------------------|
| | Frequency | Percent | Valid Percent | Cumulative Percent |
| High School | 3 | 2.4 | 2.4 | 100.0 |
| Some High School | 24 | 19.2 | 19.2 | 45.6 |
| Bachelor's degree | 33 | 26.4 | 26.4 | 26.4 |
| Master's degree | 61 | 48.8 | 48.8 | 94.4 |
| Ph.D. or other | 4 | 3.2 | 3.2 | 97.6 |
| Total | 125 | 100.0 | 100.0 | |

Figure 16 shows a better perspective on the education degree of the respondents. There is still a significant percentage of respondents with completed high school or some high school (unfinished highschool).

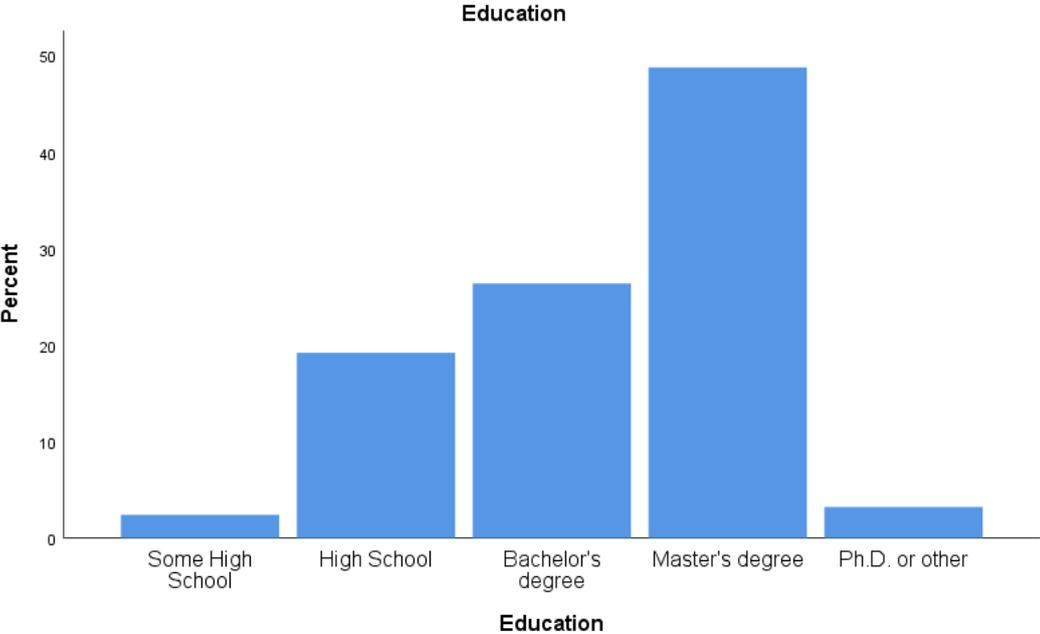


Figure 16 – Education Level

As presented in Table 10 91.2% of the respondents answered that they currently subscribe to any type of services via online/web thus showing propensity to the utilization of on-line self-service.

Table 10 - Current Self-Service Utilization

Do you subscribe any type of services services via online/web?

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|-----------|---------|---------------|--------------------|
| No | 11 | 8.8 | 8.8 | 8.8 |
| Yes | 114 | 91.2 | 91.2 | 100.0 |
| Total | 125 | 100.0 | 100.0 | |

When asked if they would subscribe, for the company they are working for, telecom services on-line, the percentage of positive answers is 86.4% as presented in Table 11. This is a binary question with no intent measurement. So, in empirical terms one can infer that there is a propension to use on-line self-service to subscribe mobile services from a Telecom.

Table 11 - Subscription for Current Company

Would you subscribe telecom services or purchase telecom products via online/web for a company you'd work for?

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|-----------|---------|---------------|--------------------|
| No | 17 | 13.6 | 13.6 | 13.6 |
| Yes | 108 | 86.4 | 86.4 | 100.0 |
| Total | 125 | 100.0 | 100.0 | |

From Table 11 it can be inferred that the adoption of online self-service could be focused in a specific age group, however data shown in the following tables show that adoption is even across age groups.

Table 12 - Online usage per age group

Do you subscribe any type of services services via online/web? * Age Crosstabulation

Count

| | | Age | | | | Total |
|--|-----|-------|-------|-------|-----|-------|
| | | 18-25 | 26-35 | 36-50 | +50 | |
| Do you subscribe any type of services services via online/web? | No | 3 | 4 | 2 | 2 | 11 |
| | Yes | 8 | 11 | 87 | 8 | 114 |
| Total | | 11 | 15 | 89 | 10 | 125 |

In Table 12 - Online usage per age group is shown that 114 respondents use online self-service tools to subscribe to any kind of service.

If you then consider the option on subscribing on line services for the company the respondent is working for 108 out of 125 say yes as presented in Table 13. The only group that shows some “adversity” regarding the online subscription is the one aged between 18 and 25, which in fact is somehow surprising.

Table 13 - Online Subscription for Company

Would you subscribe telecom services or purchase telecom products via online/web for a company you'd work for? * Age Crosstabulation

Count

| | | Age | | | | Total |
|--|-----|-------|-------|-------|-----|-------|
| | | 18-25 | 26-35 | 36-50 | +50 | |
| Would you subscribe telecom services or purchase telecom products via online/web for a company you'd work for? | No | 5 | 2 | 8 | 2 | 17 |
| | Yes | 6 | 13 | 81 | 8 | 108 |
| Total | | 11 | 15 | 89 | 10 | 125 |

Because this research is focused in B2B it would be interesting to analyze if there is a change of adoption between SME's and Corporate users.

Table 14 - SME and Corporate SST adoption

Would you subscribe telecom services or purchase telecom products via online/web for a company you'd work for?

| | | Percentage |
|----------------------|-----|---------------|
| SME | | 34,40 |
| | No | 7,20 |
| | Yes | 27,20 |
| LARGE COMPANY | | 65,60 |
| | No | 6,40 |
| | Yes | 59,20 |
| GRAND TOTAL | | 100,00 |

In Table 14 it is shown that the adoption is higher in large companies rather than in SME users.

5.2. Reliability

One of the most common used tests for internal reliability is the Cronbach's alpha. The value of alpha is between zero and one. A one value means that there is a perfect internal reliability and a zero value means there is no internal reliability. As a good rule an alpha above 0.70 is considered efficient. (Bryman & Bell, 2011). However, there is some research (Maroco & Garcia-Marques, 2006) that consider an acceptable value of 0.60, for this research a value above 0.70 was considered as adequate.

5.2.1. Perceived Usefulness

According to Table 15 the value achieved was of 0.817 which represents that the scale for this item is considered reliable.

Table 15 - Perceived Usefulness Cronbach's

| Reliability Statistics | | |
|-------------------------------|--|------------|
| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
| .814 | .817 | 3 |

As referred previously a good rule an alpha above 0.70 is considered efficient. (Bryman & Bell, 2011).

5.2.2. PERCEIVED EASE OF USE

Error! Reference source not found. PEOU as presented in Table 16 the value achieved for Cronbach's alpha was of 0.888 which represents that the scale for this item is considered reliable.

Table 16 - Perceived Ease Of Use Cronbach's

| Reliability Statistics | | |
|-------------------------------|--|-------------|
| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | TN of Items |
| .886 | .888 | 3 |

As referred previously a good rule an alpha above 0.70 is considered efficient. (Bryman & Bell, 2011).

5.2.3. NEED FOR INTERACTION

In the case of need for interaction construct, it was composed originally by three variables: NFI1, NF2 and NFI3 that can be seen in the complete survey in annex 1. However, it was required to reverse the order of variable NFI2 because the scale was reversed and would affect reliability. This new reversed variable was considered in all the analysis done afterwards.

For Need for Interaction the value achieved was of 0.746 as presented in Table 17 which represents that the scale for this item is considered reliable.

Table 17 - Need for Interaction Cronbach's

Reliability Statistics

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---------------------|---|------------|
| .746 | .746 | 3 |

As referred previously a good rule an alpha above 0.70 is considered efficient. (Bryman & Bell, 2011).

5.2.4. PRICE

For Price the value achieved for Cronbach's Alpha was of 0.865 as presented in Table 18 which represents that the scale for this item is considered reliable.

Table 18 - Price Cronbach's

Reliability Statistics

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---------------------|---|------------|
| .865 | .865 | 3 |

As referred previously a good rule an alpha above 0.70 is considered efficient. (Bryman & Bell, 2011).

5.2.5. COMPLEXITY

In the first analysis the construct complexity CPX (as per the survey in annex 1) shown an unacceptable value of .300 as per Table 19 which is not consistent with the rule of a value greater than .70 to consider the variable reliable (Bryman & Bell, 2011).

Table 19 - Complexity Cronbach's

| Reliability Statistics | | |
|-------------------------------|---|------------|
| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
| .300 | .300 | 3 |

After analyzing data, it was decided to remove the variable CPX3 to get more reliability on the complexity answers. After removing CPX3 the Cronbach's alpha moved from 0.300 to an acceptable 0.876 as presented in Table 20.

Table 20 - Complexity Cronbach's revised

| Reliability Statistics | | |
|-------------------------------|---|------------|
| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
| .874 | .876 | 2 |

All the values of the variable CPX3 were removed from all the analysis reducing the number of variables in the Complexity construct from 3 to 2.

5.3. FACTOR ANALISYS

Factor Analysis is a very commonly used technique in order to analyze data and as a good exploratory tool and allows to cluster variables that are corelated thus simplifying the analysis process. However, there is a condition that is mandatory to apply this technique which is that the number of respondents must be bigger that the number of variables. In the case of this research that criteria are met because there are 125 respondents for 23 variables (Robson, 2002).

To verify if the sample is adequate to do a principal components analysis it is common to use the Kaiser-Meyer-Olkin (KMO) Measure of Sampling adequacy and Bartlet's Sphericity Test. An adequate value for KMO is greater than 0.7 (Middling) and with a value circa 0.8 the sample is meritorious (Field, 2015).

Table 21 - KMO and Bartlett's Test

| KMO and Bartlett's Test | | |
|--|--------------------|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .794 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1049.192 |
| | Df | 91 |
| | Sig. | .000 |

For this study the value of KMO is 0.794 which is meritorious and also the Bartletts' test has $p < .001$. So, the sample is considered adequate. The next step was to extract communalities presented in Table 22.

Table 22 - Communalities

| | Initial | Extraction |
|---|---------|------------|
| Online self-service makes subscription of telecom services easier | 1.000 | .733 |
| Online self-service makes subscription of telecom services more convenient | 1.000 | .648 |
| Online self-service makes subscription of telecom services faster | 1.000 | .584 |
| Online self-service to subscribe telecom services is easy to understand | 1.000 | .696 |
| Online self-service to subscribe telecom services is simple | 1.000 | .703 |
| Using the new Online self-service to subscribe telecom services is learned fast | 1.000 | .810 |
| I prefer talking to someone rather than using an online self-service | 1.000 | .715 |
| I prefer talking to employees rather than using technology | 1.000 | .638 |
| When I buy or subscribe I prefer to do it with a sales person | 1.000 | .680 |

Communalities

| | Initial | Extraction |
|--|---------|------------|
| There is a high chance that I will stand to lose money because the online solution will not fit my needs | 1.000 | .733 |
| I am concerned that I really would not get value for money when I chose the solution online | 1.000 | .808 |
| I would subscribe to complex services like SaaS, PaaS, Security | 1.000 | .888 |
| I would subscribe to services like M2M, IoT, Managed Networks | 1.000 | .869 |

Extraction Method: Principal Component Analysis.

To select variables a communality value above 0.5 is adequate for a sample size between 100 and 200 and with relatively few factors as is the case (Field, 2015). In this research case all variables were selected.

Table 23 - Total Variance Explained

| Component | Total Variance Explained | | | | | | | | |
|-----------|--------------------------|---------------|--------------|-------------------------------------|---------------|--------------|-----------------------------------|---------------|--------------|
| | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 5.385 | 38.463 | 38.463 | 5.385 | 38.463 | 38.463 | 2.732 | 19.514 | 19.514 |
| 2 | 2.323 | 16.592 | 55.054 | 2.323 | 16.592 | 55.054 | 2.544 | 18.175 | 37.689 |
| 3 | 1.486 | 10.617 | 65.671 | 1.486 | 10.617 | 65.671 | 2.136 | 15.261 | 52.950 |
| 4 | 1.124 | 8.026 | 73.698 | 1.124 | 8.026 | 73.698 | 1.847 | 13.190 | 66.139 |
| 5 | .764 | 5.457 | 79.154 | .764 | 5.457 | 79.154 | 1.822 | 13.015 | 79.154 |
| 6 | .515 | 3.682 | 82.836 | | | | | | |
| 7 | .475 | 3.391 | 86.227 | | | | | | |
| 8 | .429 | 3.064 | 89.291 | | | | | | |
| 9 | .364 | 2.598 | 91.888 | | | | | | |
| 10 | .335 | 2.394 | 94.282 | | | | | | |
| 11 | .268 | 1.911 | 96.193 | | | | | | |
| 12 | .225 | 1.606 | 97.799 | | | | | | |
| 13 | .178 | 1.271 | 99.070 | | | | | | |
| 14 | .130 | .930 | 100.000 | | | | | | |

Extraction Method: Principal Component Analysis.

One of the most useful tools to use for the selection of components number is the scree plots and components with eigen values above 1. However, it can be a very strict criteria and an adoption of a value of 0.7 is more adequate. (Field, 2015). With a selection of 5 components as presented in Table 23 almost of 80% of the variance is explained.

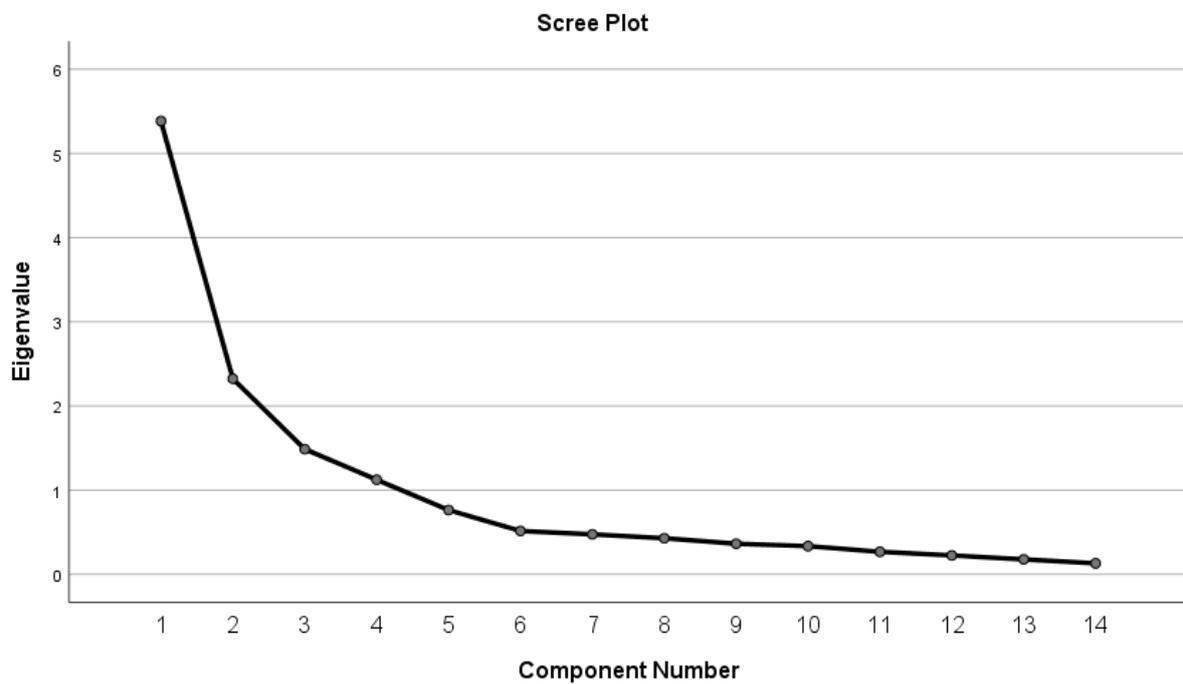


Figure 17 - Scree Plot

Given the used criteria of choosing factors with eigenvalues above 0.7 in this research as per the scree plot in Figure 17 we will have 5 components as a result of this choice. This means that we can group the variables into 5 components that will be mapped to the variables of the conceptual framework.

With the rotated component matrix, the factors will be clustered into the components that show a strong relation (above 0.5) with it. This rotated matrix is presented in Table 24.

Table 24 - Rotated component matrix

| | Component | | | | |
|--|-----------|------|-------------|------|-------|
| | 1 | 2 | 3 | 4 | 5 |
| Online self service makes subscription of telecom services easier | -.203 | .440 | .667 | .237 | -.193 |
| Online self service makes subscription of telecom services more convenient | -.001 | .209 | .882 | .080 | -.122 |
| Online self service makes subscription of telecom services faster | -.063 | .357 | .710 | .020 | -.091 |

| Component (cont'd) | | | | | |
|--|-------------|-------------|-------|-------------|-------------|
| | 1 | 2 | 3 | 4 | 5 |
| Online self service to subscribe telecom services is easy to understand | -.184 | .831 | .219 | .118 | -.202 |
| Online self service to subscribe telecom services is simple | -.080 | .828 | .243 | .185 | -.043 |
| Using the new Online self service to subscribe telecom services is learned fast | -.132 | .798 | .404 | .138 | -.046 |
| I prefer talking to someone rather than using an online self-service | .370 | -.002 | -.244 | -.106 | .712 |
| I prefer talking to employees rather than using technology | -.005 | -.247 | -.023 | -.086 | .866 |
| When I buy or subscribe I prefer to do it with a sales person | .518 | .009 | -.219 | -.158 | .585 |
| There is a high chance that I will stand to lose money because the solution online will cost more than it should | .889 | -.152 | .011 | .018 | .018 |
| There is a high chance that I will stand to lose money because the online solution will not fit my needs | .804 | -.092 | -.080 | -.083 | .261 |
| I am concerned that I really would not get value for money when I chose the solution online | .886 | -.122 | -.069 | .020 | .096 |
| I would subscribe to complex services like SaaS, PaaS, Security | -.001 | .137 | .071 | .942 | -.037 |
| I would subscribe to services like M2M, IoT, Managed Networks | -.052 | .204 | .122 | .882 | -.198 |

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

After analyzing the component rotated matrix, it was possible to cluster components(factors) according to this relation:

- Factor 1 > Price (PR)
- Factor 2 > Perceived Ease Of Use (PEOU)
- Factor 3 > Perceived Usefulness (PU)
- Factor 4 > Complexity (CPX)
- Factor 5 > Need For Interaction (NFI)

PEOU, PU, CPX, PR and NFI are the independent variables that influence the dependent variable IAS (Intention to Adopt Self-Service) that in the conceptual framework is the attitude towards the use of self-service subscription.

5.4. Validity

In order to validate if the factors have any kind of significant relationship with the intention for using online self-service to subscribe telecom services, the Pearson's r method was selected. A value between 0 and 1 is expected to demonstrate the strength of the relationship. It can be either positive or negative reflecting the direction of the relationship (Bryman & Bell, 2011).

According to Table 25 PU, PEOU and CPX have a positive relationship with IAS while PR has a negative one. All the previously mentioned variables have a significant relationship.

Table 25 - Pearson's r

| | | Correlations | | | | | |
|---|---------------------|--------------|--------|--------|--------|-------|-----|
| | | PR | PEOU | PU | CPX | NFI | IAS |
| I intend to use Online self-service to subscribe telecom services (IAS) | Pearson Correlation | -.229** | .357** | .578** | .226** | -.153 | 1 |
| | Sig. (Significance) | .008 | .000 | .000 | .008 | .076 | |
| | N | 135 | 135 | 135 | 135 | 135 | 135 |

** . Correlation is significant at the 0.01 level (2-tailed).

However, NFI has a non-significant relationship with IAS because Sig.(the statistical significance) is greater than 0.05 and according to (Bryman & Bell, 2011) "If the probability of your test statistic or one more extreme having occurred by chance alone is very low (usually 0.05 or lower), then you have a statistically significant relationship" which is not the case.

5.5. Hypothesis Result – Multiple Linear Regression

In order to test the predictors of intention for using online to subscribe telecom services a multiple regression analysis using the enter method was done. The enter method means that all variables being or not statistically significant will be included. The dependent variables used were the factors that were determined in the previous section.

Table 26 - Model Summary

| Model Summary ^b | | | | |
|----------------------------|-------------------|----------|-------------------|----------------------------|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .767 ^a | .588 | .572 | .583 |

a. Predictors: (Constant), PR, PEOU, PE, CPX, NFI

b. Dependent Variable: IAS

The computed model has an adjusted R square above 0.5, as presented in Table 25. This means that the model is well adjusted to the data because it can predict more than half of the variation. (Saunders, Lewis, & Thornhill, 2009).

The computed regression coefficients (B) of the model are presented in Table 27.

Table 27 - Regression Coefficients

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|------------|-----------------------------|------------|---------------------------|--------|------|
| | B | Std. Error | Beta | | |
| (Constant) | 4.163 | .050 | | 83.002 | .000 |
| PR | -.204 | .050 | -.229 | -4.055 | .000 |
| PEOU | .318 | .050 | .357 | 6.319 | .000 |
| PU | .515 | .050 | .578 | 10.228 | .000 |
| CPX | .202 | .050 | .226 | 4.004 | .000 |
| NFI | -.136 | .050 | -.153 | -2.709 | .008 |

Only the coefficient NFI has no statistically significance (Sig.<0.05) as presented in Table 27 but that was already expected from the Pearson's r analysis.

5.5.1. H1. Perceived Usefulness impacts positively the attitude towards the use of self-service telecom services subscription

According to the predictors of the model for PU, (B) has a value of 0.515, is positive so the impact is positive and is significant. The hypothesis is **ACCEPTED**.

5.5.2. H2. Perceived Ease Of Use impacts positively the attitude towards the use of self-service telecom services subscription

According to the predictors of the model for PEOU, (B) has a value of 0.318, is positive so the impact is positive and is significant. The hypothesis is **ACCEPTED**.

5.5.3. H3. The need for interaction impacts negatively the attitude towards the use of self-service telecom services subscription

According to the predictors it is not statistically relevant. This variable has also proved not to have a good pearson's correlation with intention. The hypothesis is **REJECTED**.

5.5.4. H4. Price impacts negatively the attitude towards the use of self-service telecom services subscription

According to the predictors of the model for PU, (B) has a value of - 0.204, is negative so the impact is negative and is significant. The hypothesis is **ACCEPTED**.

5.5.5. H5. Complexity impacts negatively the attitude towards the use of self-service telecom services subscription

According to the predictors of the model for CPX, (B) has a value of 0.202, is positive so the impact is positive and is significant. The hypothesis is **REJECTED**.

5.5.6. Hypothesis Summary

Table 28 summarizes the results of the hypothesis testing.

Table 28 - Hypothesis test summary

| Hypothesis | Result / Cause |
|--|--|
| H1. Perceived Usefulness impacts positively the attitude towards the use of self-service telecom services subscription | Accepted (B) is positive |
| H2. Perceived Ease Of Use impacts positively the attitude towards the use of self-service telecom services subscription | Accepted (B) is positive |
| H3. The need for interaction impacts negatively the attitude towards the use of self-service telecom services subscription | Rejected Not statistically relevant |
| H4. Price impacts negatively the attitude towards the use of self-service telecom services subscription | Accepted (B) is positive |
| H5. Complexity impacts negatively the attitude towards the use of self-service telecom services subscription | Rejected (B) is positive. Should be negative to be accepted |

This means that 3 out of the 5 proposed hypotheses were accepted. The other 2 rejected hypotheses show that there is additional work and research to be done.

6. Conclusion

This chapter concludes the work that has been done regarding adoption of on-line self-service for B2B customers of a Telecom company.

The first section will start by answering the research questions and in the second section it will be presented the contribution of this work and future work to be done.

6.1. RQ1: “What factors influence the adoption of online self-service technologies by B2B customers of a CSP?”

The hypothesis tests have shown that there is an influence on the adoption of self-services technologies by B2B customers by:

- Perceived Usefulness
- Perceived Ease of Use
- Price

Also using a binary variable on the survey showed that 86.4% of the respondents would subscribe services online for the company they are working for.

The other two factors Need for Interaction and Complexity seem to have no impact or require further study in the intention of usage.

It can be concluded in this research that the factors influencing adoption of on-line self-service are: Perceived Usefulness, Perceived Ease of Use and Price.

6.2. RSQa: “Is it viable to implement on-line self-service / self-provisioning for B2B?”

In the evaluation chapter, need for human interaction was not much valued nor it was considered a factor influencing adoption and 86.4% of the respondents would subscribe services online for the company they are working for. So, it can be concluded that is viable to implement on-line self-service for B2B.

However, price has a negative impact on the interaction, for this reason it is important to explain very well the pricing components and have a very clear subscription process in order to have transparency and clarity so that the user will not feel that is losing by subscribing online.

6.3. RSQb: “Will all segments adhere to self-service?”

The descriptive statistics shown that there is no difference of behaviors between respondents of different type of companies, namely small, medium or large. So, all segments will adhere but with more adherence on the corporate side which is surprising because SME is considered sometimes a “volume” market.

6.4. RSQc: “Is it only applicable to simple products or can be used in more complex ones (like SaaS/PaaS/Big Data)?”

It was not possible to determine if complexity is a major issue on adopting and subscribing more complex services online. The research showed that the perceived usefulness, perceived ease of use and price are more important factors to take into consideration and that complexity had no influence in the adoption of SSTs.

6.5. Contributions

At the time of the research there is not much work on adoption of SST's by Telecom B2B customers, so the major contribution of this work is bringing some insight on self-service adoption on the subscription of telecom services for B2B.

Since the sample was collected online one can assume that the application of this research is universal, but some refinement can be done in future works.

6.6. Future work

After finishing this research areas that could be explored and have deeper research could be:

- MOBILE APPS – The present research considered only web (online) usage it would be interesting to understand if there is behavior change when using a mobile application app;
- SAMPLE and population REFINEMENT – Refine the respondents to the survey. The used population is a general one. Refining the target population to deciders and purchasers for telecom services in companies could improve a lot the insight on this field of study. It would be important also to focus on country specific data;

Focus on SME – SME is considered a volume market, so it needs more volume and automated solutions. Surprisingly it came out that the adoption rate for SME is lower than for corporate. Probably the refinement of the survey in terms of Need for Interaction and Complexity could led to different conclusions.

7. References

- Abbas, M., Nawaz, M. S., Ahmad, J., & Ashraf, M. (2017). The effect of innovation and consumer related factors on consumer resistance to innovation. *Cogent Business & Management*, 4:1.
- Abraham, J. (2020). *COVID-19: the pandemic will accelerate CSPs investments into self-service functions*. Analysis Mason.
- Almquist, E., Cleghorn, J., & Sherer, L. (2018). The B2B Elements of Value. *Harvard Business Review March-April*, 72–81.
- Aven, T., & Renn, O. (2009). On risk defined as an event where the outcome is uncertain. *Journal of Risk Research Volume 12, Issue 1*.
- Bailey, A. A., Pentina, I., Mishra, A. S., & Mimoun, M. S. (2017). Mobile payments adoption by US consumers: an extended TAM. *International Journal of Retail & Distribution Management Vol. 45 No. 6*, 626-640.
- Bitner, M. J., Ostrom, L. A., & Meuter, M. L. (2002). Implementing successful self-service technologies. *Academy of Management Executive*, 16(4), 96-108.
- Blont, J. (2020). *Virtual Selling: A Quick-Start Guide to Leveraging Video, Technology, and Virtual Communication Channels to Engage Remote Buyers and Close Deals Fast*. John Wiley & Sons.
- Blut, M., Wang, C., & Schoefe, K. (2016). Factors Influencing the Acceptance of Self-Service Technologies: A Meta-Analysis. *Journal of Service Research*.
- Bollard, A., Larrea, E., Singla, A., & Sood, R. (2017). The next-generation operating model for the digital world. *Digital McKinsey*. McKinsey.
- Bryman, A., & Bell, E. (2011). *Business Research Methods*. Oxford University Press.
- Cap Gemini Research Institute. (2020). *COVID-19 and the connected telco consumer*. Cap Gemini Research Institute.
- Caylar, P.-L., & Ménard, A. (2016). *How telecom companies can win in the digital revolution*. Digital McKinsey.
- Chou, T.-H. (2020). Factors influencing the development of innovative business model in the IT industry. *Technology Analysis & Strategic Management*.
- Chuang, S.-H., & Lin, H.-N. (June 2005). Co-creating e-service innovations: Theory, practice, and impact on firm performance. *International Journal of Information Management*.
- Considine, E., & Cormican, K. (2017). The rise of the prosumer: an analysis of self-service technology adoption in a corporate context. *International Journal of Information Systems and Project Management, Vol. 5, No. 2*, 25-39.

- Curran, J. M., & Meuter, M. L. (2005). Self-service technology adoption: comparing three technologies. *Journal of Services Marketing, Vol. 19 Iss: 2*, 103-113.
- Dabholkar, P. A. (1996). Consumer evaluations of new technology-based self-service options: An investigation of alternative models of service quality. *Intern. J. of Research in Marketing 13*, 29-51.
- Dabholkar, P. A., & Bagozzi, R. P. (2002). An Attitudinal Model of Technology-Based Self-Service: Moderating Effects of Consumer Traits and Situational Factors. *Journal of the Academy of Marketing Science volume 30, Article number: 184*.
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly Vol. 13 N° 3*, 319-340.
- Deloitte. (2016). *Igniting the new telco value engine*. Deloitte.
- Dick, J. (2020, January 28). *Live Chat Exposes a Fatal Flaw in Your Go-to-Market*. Retrieved from Hubspot: <https://blog.hubspot.com/sales/live-chat-go-to-market-flaw>
- Fernandes, T., & Oliveira, E. (2021). Understanding consumers' acceptance of automated technologies in service encounters: Drivers of digital voice assistants adoption. *Journal of Business Research Vol. 122*, 180-191.
- Field, A. (2015). *Discovering Statistics Using IBM SPSS Statistics 4th*. SAGE Publishing.
- Fishbein, M., & Ajzen, I. (1975). *Belief, Intention and Behaviour: An Introduction to Theory and Research*. Addison-Wesley.
- Gartner Glossary. (n.d.). Retrieved from Gartner: <https://www.gartner.com/en/information-technology/glossary/csp-communications-service-provider>
- Gavin, R., Harrison, L., Plotkin, C. L., Spillecke, D., & Stanley, J. (2020). *The B2B digital inflection point: How sales have changed during COVID-19*. McKinsey & Company.
- Gintel. (2020, March 12). *Can MNOs and operators stop the decline in B2B revenues?* Retrieved from Gintel: <https://www.gintel.com/blog/519-how-can-mnos-and-operators-stop-the-decline-in-b2b-revenues>
- Gu, J.-C., Lee, S.-C., & Suh, Y.-H. (2009). Determinants of behavioral intention to mobile banking. *Expert Systems with Applications 36*, 11605–11616.
- Handscorn, C., & Thaker, S. (2028, 2). *Activate agility: the five avenues to success*. Retrieved from McKinsey: https://www.mckinsey.com/business-functions/organization/our-insights/the-organization-blog/activate-agility-get-these-five-things-right?cid=other-soc-twi-mip-mck-oth-1803&kui=22Dz35E4Rh_tNiibqblMrg
- Hartmann, N. N., & Lussierb, B. (2020). Managing the sales force through the unexpected exogenous COVID-19 crisis. *Industrial Marketing Management 88*, 101-111.

- Heinonen, K., & Strandvik, T. (2020). Reframing service innovation: COVID-19 as a catalyst for imposed service innovation. *Journal of Service Management*.
- Heinz, J. (2020, November 20). *New Channels for Old Businesses: Examining the Drivers and Obstacles of Mobile Commerce Adoption for Complex Products*. Retrieved from Semantic Scholar: <https://www.semanticscholar.org/>
- Hilton, T., Hughes, T., Little, E., & Marandi, E. (2013). Adopting self-service technology to do more with less. *Journal of Services Marketing Vol. 27 No. 1*, 3-12.
- Hong, S. H., & Yu, J. H. (2018). Identification of external variables for the Technology Acceptance Model(TAM) in the assessment of BIM application for mobile devices. *2nd International Conference on Architecture and Civil Engineering (ICACE 2018)* . IOP Publishing.
- Hsieh, C.-t. (2005). Implementing Self-Service Technology to Gain Competitive Advantages. *Communications of the IIMA Volume 5 Issue 1*.
- Hughes, J. (2005, May 2). *The Evolution of Self-Service*. Retrieved from Destination CRM: <https://www.destinationcrm.com/Articles/Web-Exclusives/Viewpoints/The-Evolution-of-Self-Service-43354.aspx>
- IBM. (2016). *Outthinking disruption in communications: The 2020 CSP in the cognitive era*. IBM Corporation.
- Iqbal, M. S., Hassan, M. U., & Habibah, U. (2018). *Impact of self-service technology (SST) service quality on customer loyalty and behavioral intention: The mediating role of customer satisfaction*. Cogent Business & Management.
- Kapoor, K. K., Dwivedi, Y. K., & Williams, M. D. (2014). Rogers' Innovation Adoption Attributes: A Systematic Review and Synthesis of Existing Research. *Information Systems Management, 31:1*, 74-91.
- Kattara, H. S., & El-Said, O. A. (2014). Customers' preferences for new technology-based self-services versus human interaction services in hotels. *Tourism and Hospitality Research 2014, Vol. 13(2)* , 67–82.
- LaMorte, W. W. (2019, September 9). *Diffusion of Innovation Theory*. Retrieved from Behavioral Change Models: <https://sphweb.bumc.bu.edu/otlt/mph-modules/sb/behavioralchangetheories/behavioralchangetheories4.html>
- Maity, M., & Dass, M. (2014). Consumer decision-making across modern and traditional channels: E-commerce, m-commerce, in-store. *Decision Support Systems, 34-46*.
- Malhotra, N. K., & Birks, D. F. (2006). *Marketing Research: An Applied Approach*. Essex: Pearson Education Limited.

- Marinova., Ruyter, d., Huang, Meuter, & Challagalla. (2017). Getting Smart: Learning From Technology-Empowered Frontline Interactions. *Journal of Service Research*, 20(1), 29-42.
- Market Research Future. (2020, September). *Self-Service Technology Market Research Report by Machine Type (ATM, Kiosk, Beverage Vending Machine), Application (Banking, Entertainment, Food & Beverage, Healthcare), Interface (Online / Internet, Telephone / IVR), and Region-Global Forecast till 2023*. Retrieved from Market Research Future: <https://www.marketresearchfuture.com/reports/self-service-technologies-market-927>
- Markets, R. a. (2020). *Telecommunications Network Operators: 2Q20 Market Review*. Dublin: Research and Markets.
- Maroco, J., & Garcia-Marques, T. (2006). Qual a fiabilidade do alfa de Cronbach? Questões antigas e soluções modernas? *Laboratório de Psicologia*, 4(1), 65-90.
- Meuter, M. L., Ostrom, A. L., & Roundt, R. I. (2000). Self-Service Technologies: Understanding Customer Satisfaction with Technology-Based Service Encounters. *Journal of Marketing Vol. 64*, 50-64.
- Müller, H., Sedley, A., & Ferrall-Nunge, E. (2014). *Ways of Knowing in HCI*. New York: Springer.
- Nuance. (2013). *Survey Shows: Majority of Consumers Frustrated with Web Self-Service, Want a "Human" Touch*. Retrieved from Nuance: <https://news.nuance.com/2013-12-16-Survey-Shows-Majority-of-Consumers-Frustrated-with-Web-Self-Service-Want-a-Human-Touch>
- Nyoro, M., Kamau, J. W., Wanyembi, G. W., Titus, W. S., & Dinda, W. A. (2015). Review of Technology Acceptance Model usage in predicting e-commerce adoption. *International Journal of Application or Innovation in Engineering & Management*, 46-49.
- Okeleke, A. (2020). *Growing revenue with customer-centric buying experiences*. OMDIA.
- Panajotovic, B., & Odadzic, B. (2009). Architecture and Principles for the Customer Self-Service Management in Telecommunication. *Fifth International Conference on Networking and Services*, (pp. 143-148). Valencia.
- Pawłowski, M., & Pastuszak, Z. (2016). B2B Customers Buying Behavior. *International Journal of Synergy and Research Vol.5*, 19-35.
- Posey, M. (2020, March 11). *Analyst Insight*. Retrieved from Vodafone Business: <https://www.vodafone.com/business/news-and-insights/analyst-view/vodafone-business-from-telco-to-tech-comms>
- Presser, S., Couper, M. P., Lessler, J. T., Martin, E., Martin, J., Rothgeb, J. M., & Singer, E. (2004). Methods for Testing and Evaluating Survey Questions. *Public Opinion Quarterly, Volume 68, Issue 1*, 109-130.

- QuestionPro. (2020, November 21). *CONVENIENCE SAMPLING: DEFINITION, APPLICATIONS, ADVANTAGES, METHOD, AND EXAMPLES*. Retrieved from QuestionPro: <https://www.questionpro.com/blog/convenience-sampling/>
- Ramayah, T., & Ignatius, J. (2005). Impact of Perceived usefulness, Perceived ease of use and Perceived Enjoyment on Intention to shop online. *ICFAI Journal of Systems Management (IJSM)*.
- Renny, Guritno, S., & Siringoringo, H. (2012). Perceived Usefulness, Ease of use, and Attitude Towards Online Shopping Usefulness Towards Online Airlines Ticket Purchase . *1st World Congress of Administrative & Political Sciences (ADPOL-2012)* (pp. 212-216). Procedia - Social and Behavioral Sciences 81.
- Rigopoulos, G., & Askounis, D. (2007). A TAM Framework to Evaluate Users ' Perception towards Online Electronic Payments. *Journal of Internet Banking and Commerce*.
- Robson, C. (2002). *Real World Research*. Blackwell Publishing.
- Rogers, E. M. (2003). *Diffusion of innovations 5th editon*. Freepress.
- Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research Methods for Business Students 5th edition*. Pearson Education Limited.
- Singer, L. (2019). *On the Diffusion of Innovations: How New Ideas Spread*. Retrieved from Exploring how developers can work together better: <https://leif.me/on-the-diffusion-of-innovations-how-new-ideas-spread/>
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics 7th Edition*. New York: Pearson.
- Tarhini, A., Hone, K., & Liu, X. (2013). • User Acceptance Towards Web-based Learning Systems: Investigating the role of Social, Organizational and Individual factors in European Higher Education. *Procedia Computer Science* 17, 189 – 197.
- Tella, A., & Gbola Olasina. (2014). Predicting Users' Continuance Intention Toward E-payment System: An Extension of the Technology Acceptance Model. *International Journal of Information Systems and Social Change*, 5(1), 47-67.
- Vakulenko, Y., Hellström, D., & Oghazi, P. (2018). Customer value in self-service kiosks: a systematic literature review. *International Journal of Retail & Distribution Management*, Vol. 46 No. 5, 507-527.
- Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science* Vol. 46, No. 2, 186–204.
- Vuković, M., Pivac, S., & Kundid, D. (2019). Technology Acceptance Model for the Internet Banking Acceptance in Split. *Business Systems Research* Vol. 10 No. 2, 124-140.

Yang, Y.-C., Yang, Y.-Y., & Liu, S.-W. (2012). An Integrative Model for Self-Service Technology Adoption.
Applied Mechanics and Materials.

8. Annex 1 - Survey

| # | Construct | Question |
|----|-----------|---|
| 1 | SOCIO1 | What is your age? 18-25 26-35 36-50 +50 |
| 2 | SOCIO2 | What is your gender? Female Male Other |
| 3 | SOCIO3 | What is your highest education level you have completed? Some High School High School Bachelor's Degree Master's Degree Ph.D. or other Prefer not to say |
| 4 | ADOPT1 | Do you subscribe any type of services services via online/web? Yes No |
| 5 | ADOPT2 | Would you subscribe telecom services or purchase telecom products via online/web for a company you'd work for? Yes No |
| 6 | COMP1 | How many employess does your company has in your location? 1 to 10 11 to 49 50 to 250 More than 250 |
| 7 | COMP2 | What is the turnover of your company in your location? Less than 2 Meur 2 to 10 Meur 10 to 50 Meur More than 50 Meur |
| 8 | IAS | Intention to Adopt SelfService I intend to use Online self service to subscribe telecom services |
| | | Perceived Usefulness (PU) |
| 9 | PU1 | Online self service makes subscription of telecom services easier |
| 10 | PU2 | Online self service makes subscription of telecom services more convenient |
| 11 | PU3 | Online self service makes subscription of telecom services faster |
| | | Perceived Ease Of Use (PEOU) |
| 12 | PEOU1 | Online self service to subscribe telecom services is easy to understand |
| 13 | PEOU2 | Online self service to subscribe telecom services is simple |
| 14 | PEOU3 | Using the new Online self service to subscribe telecom services is learned fast |
| | | Need for Interaction (NFI) |
| 15 | NFI1 | I prefer talking to someone rather than using an on-line tool |
| 16 | NFI2 | I prefer to use technology rather than talking to employees |
| 17 | NFI3 | When I buy or subscribe I prefer to do it with a sales person |
| | | Price (PR) |
| 18 | PR1 | There is a high chance that I will stand to lose money because the solution online will cost more than it should |
| 19 | PR2 | There is a high chance that I will stand to lose money because the online solution will not fit my needs |
| 20 | PR3 | I am concerned that I really would not get value for money when I chose the solution online |
| | | Complexity (CPX) |
| 21 | CPX1 | I would subscribe to complex services like SaaS, PaaS, Security |
| 22 | CPX2 | I would subscribe to services like M2M, IoT, Managed Networks |
| 23 | CPX3 | I would subscribe only to simple products like mobile and fixed voice |